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THIS ISSUE CONTAINS:

HS-014 707 - HS-014 870  
HS-801 145; 147-148; 156; 161;  
165; 167; 172; 186-190; 192-197

National Highway  
Traffic Safety  
Administration



*Shelve in Stacks S.B.T.*

# Highway Safety Literature

...A MONTHLY ABSTRACT JOURNAL

## AVAILABILITY OF DOCUMENTS

Documents listed in **Highway Safety Literature** are not available from the National Highway Traffic Safety Administration unless so specified. They must be ordered from the sources indicated on the citations, usually at cost. Ordering information for the most common sources is given below.

**NTIS:** National Technical Information Service, Springfield, Va. 22151. Order by title and accession number: PB, AD, or HS.

**GPO:** Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Give corporate author, title, personal author, and report number.

**Corporate author:** Inquiries should be addressed to the organization listed in the individual citation.

**Reference copy only:** Documents may be examined at the NHTSA Technical Reference Division or borrowed on inter-library loan through your local library.

**See serial citation:** Obtain through normal loan or purchase of the given serial.

**SAE:** Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

**TRB:** Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

Material directly related to Highway and/or Motor Vehicle Safety is solicited for inclusion in Highway Safety Literature. Topics must fall within the scope of the mission of the National Highway Traffic Safety Administration. Submit material, together with a written statement of approval for publication to:

Technical Services Division (N48-41)  
National Highway Traffic  
Safety Administration  
400 7th Street, S.W.  
Washington, D.C. 20590

 Please indicate availability source and price for the material.

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## **SUBJECT INDEX**

look for the elimination of the spare tire, perhaps on model cars, is examined, with emphasis on the run-flat. The effects of the energy crisis on vehicle and tire design are noted. Various run-flat or total mobility designs are described, and benefits and costs are outlined. Attitudes of major automotive companies are cited. Radial tire modifications are illustrated.

M. Callahan  
Automotive Industries v150 n9 p37-42 (1 May 1974)

Availability: See publication

4 708

## PROGRAMMING MOTOR FLEET SAFETY

Guidelines for a motor fleet safety program are presented. The program includes suggestions on recruitment, training, motivation, recognition for operators of trucks, buses, postal, transit, and similar vehicles. The corporate obligation to protect employees and the public is stressed. Safety devices, information, and training techniques for driver evaluation, and specific training courses are outlined. Safety driving incentives are also discussed.

National Safety News v109 n5 p51-8 (May 1974)

8 refs

Availability: See publication

4 709

## Automotive Electronics

Automotive developments and applications of electronic technology are reviewed in a series of presentations offered in four parts: basic solid-state electronics; automotive electronic control engineering; environmental, mechanical, and diagnostic electronic interfaces; and design examples.

Sponsored by Society of Automotive Engineers, Inc., New York; Institute of Electrical and Electronics Engineers, New York  
Rept. No. SAE-SP-388; IEEE-74CH0871-4VT ; 1974 ; 264p

Presented at the 1974 SAE/IEEE Conference, Tutorial Sessions on Automotive Electronics, Detroit, 27-8 Feb 1974.  
Includes HS-014 710--HS-014 723.

Availability: SAE

4 710

## Basic Solid-State Physics

Solid-state physics is surveyed from the user's viewpoint, with the approach being essentially nonmathematical and phenomenological. Analogues are used when possible. Atomic structure is reviewed along with solid bonding, crystallinity, and energy-band concepts. Electrical conduction is described, and differences between metals, insulators, and semiconductors are illustrated.

RCA Labs., Somerville, N. J. Solid State Technology Center  
Publ: HS-014 709, Automotive Electronics, New York, 1974

p13-13

Rept. No. SAE-740009 ; 1974 ; 5refs

Availability: In HS-014 709

HS-014 711

## DISCRETE SOLID-STATE DEVICES

A fundamental knowledge of solid-state physics is used to gain understanding of the two basic solid-state devices - bipolar and field-effect transistors. The bipolar transistor is treated as two junctions communicating through a common region (the base). The functions of charge injection and collection are studied and developed to explain the observed static (d-c) volt-ampere characteristics. Major bipolar-transistor parameters are then reviewed. Finally, the limitations in gain, voltage, and power are discussed. There are basically two forms of field-effect transistors: the junction field effect transistor (JFET) and the metal oxide semiconductor (MOS). Both forms use a voltage applied to a gate electrode or region to control charge (current) flow between source and drain terminals. This action is studied and used to develop the observed static (d-c) volt-ampere characteristic. The major field-effect transistor parameters are then reviewed. Finally, the limitations in gain, voltage, and power are discussed. Appendixes review transistor evolution, lesser known solid-state devices, and thermal resistance.

by J. A. Olmstead

RCA Labs., Somerville, N. J. Solid State Technology Center

Publ: HS-014 709, Automotive Electronics, New York, 1974

p14-37

Rept. No. SAE-740010 ; 1974 ; 6refs

Availability: In HS-014 709

HS-014 712

## INTEGRATED SOLID-STATE DEVICES

Hybrid monolithic thin-film and thick-film technologies are discussed with emphasis on monolithic integrated circuits. Processing, component construction, characteristics and limitations of the components, and pertinent parasitic effects are described and illustrated. Packaging, thermal considerations, reliability, and cost are also discussed.

by C. F. Wheatley, Jr.

RCA Labs., Somerville, N. J. Solid State Technology Center

Publ: HS-014 709, Automotive Electronics, New York, 1974

p38-66

Rept. No. SAE-740011 ; 1974 ; 26refs

Availability: In HS-014 709

HS-014 713

## LINEAR MONOLITHIC CIRCUIT TECHNIQUES

Basic circuit design techniques used in monolithic linear integrated circuits are discussed. Basic diode and transistor circuit behavior is defined, and basic general purpose circuits characteristic of monolithic designs are analyzed. These circuits include current sources and mirrors, differential amplifiers, d-c level-shift circuits, Darlington gain blocks, and

output stages. The discussions are summarized by an analysis of a simplified CA741-type operational amplifier design.

by A. J. Leidich  
RCA Labs., Somerville, N. J. Solid State Technology Center  
Publ: HS-014 709, Automotive Electronics, New York, 1974  
p67-81  
Rept. No. SAE-740012 ; 1974 ; 2refs  
Availability: In HS-014 709

HS-014 714

## DIGITAL ELECTRONICS

Digital electronics technology is introduced with a pragmatic approach taken in the presentation of the basic building blocks: inverters, gates, flip-flops, etc. Boolean algebra and the mathematics for mapping digital circuits are not treated, but the terminology of digital circuits is explored along with the realization of circuit elements in popular digital integrated circuit technologies. A table of possible areas of application for digital circuits in the automobile is included.

by D. Block  
RCA Labs., Somerville, N. J. Solid State Technology Center  
Publ: HS-014 709, Automotive Electronics, New York, 1974  
p82-92  
Rept. No. SAE-740013 ; 1974 ; 4refs  
Availability: In HS-014 709

HS-014 715

## ELECTRONIC CLOSED LOOP CONTROLS FOR THE AUTOMOBILE

The application of control system technology to the design of electronic closed loop controls for the automobile is discussed. Several basic theoretical concepts which are pertinent to automotive problems are reviewed, including: open and closed loop control, step response, time delay, and the proportional-integral controller. These concepts are illustrated by an analysis of the stoichiometric air-fuel ratio control problem.

by J. F. Cassidy, Jr.  
General Motors Research Labs., Warren, Mich.  
Publ: HS-014 709, Automotive Electronics, New York, 1974  
p95-106  
Rept. No. SAE-740014 ; 1974 ; 12refs  
Availability: In HS-014 709

HS-014 716

## SENSORS, DISPLAYS, AND SIGNAL CONDITIONING

An introductory survey of sensors, displays, and signal processors of potential value to automotive control designers is presented. The sensors section discusses position sensing, pressure sensing, and temperature sensing. The interface section considers general use semiconductor signal processor-to-sensor interface components and single chip subsystem components. The displays and interface elements section covers standard digital displays and the interface elements required to drive them. A case is made for the ultimate success of com-

binational components which are defined as single chip components that combine the sensor and interface circuit.

by R. B. Hood  
Automotive Products, Mountain View, Calif.  
Publ: HS-014 709, Automotive Electronics, New York, 1974  
p107-93  
Rept. No. SAE-740015 ; 1974 ; 23refs  
Availability: In HS-014 709

HS-014 717

## ACTUATING DEVICES FOR ELECTRONIC CONTROLLED SYSTEMS

The output signals from electronic circuits in suggested computerized systems can seldom be used directly to accomplish intended results in a vehicle. It is necessary to introduce a device that must transduce or amplify this signal as instructed by the electronic controls. These devices can be electromechanical, electromagnetic, or electrofluidic. The devices and their intended use in a system are described, and criteria for selecting the proper device for desired results are suggested.

by F. Berger  
Essex International, Inc., Detroit, Mich.  
Publ: HS-014 709, Automotive Electronics, New York, 1974  
p194-202  
Rept. No. SAE-740016 ; 1974 ; 4refs  
Availability: In HS-014 709

HS-014 718

## ENVIRONMENTAL GUIDELINES FOR THE DESIGNER OF AUTOMOTIVE ELECTRONIC COMPONENTS

The climatic, dynamic, and electromagnetic environments in which electronic packages must survive at various locations in the automobile are described. Previously available climatic data are organized to be useful to the designer. New dynamic information that provides power spectral information for various locations on the automobile is presented. The electromagnetic information includes power line transients, voltage regulation, and steady-state noise information.

by O. T. McCarter  
General Motors Engineering Staff, Warren, Mich.  
Publ: HS-014 709, Automotive Electronics, New York, 1974  
p205-24  
Rept. No. SAE-740 017 ; 1974 ; 14refs  
Availability: In HS-014 709

HS-014 719

## ELECTRONICS AND AUTOMOTIVE ENGINEERING

The automotive industry's reluctance to implement new electronics applications is discussed with emphasis on the basis on which design engineers accept or reject automotive electronics designs. Unless these new designs demonstrate economic or other advantages over designs emanating from traditional technology, they will be rejected. Several areas of uncontested electronic application are cited: fuel metering, emissions/diagnostics, antiskid, radio, headlamp dimmer, and seat

check. A careful cost effectiveness of future implementation of electronic systems is recommended.

F. Ziomek  
Motor Co., Dearborn, Mich.  
HS-014 709, Automotive Electronics, New York, 1974  
7  
No. SAE-740018 ; 1974 ; 1ref  
Availability: In HS-014 709

14 720

## **ELECTRONIC AIDS TO DETERMINE AND DIAGNOSE AUTOMOBILE HEALTH**

of the vehicle diagnostic systems that have recently developed and possible approaches for the future are discussed. On- and off-board systems are described. It is noted that current changes in automotive design, legislation, economic and consumer forces are challenging the industry to maintain and better its service standards. The role of electronics and innovative sensors is suggested.

P. Bartl  
Inc., Harrisburg, Pa.  
HS-014 709, Automotive Electronics, New York, 1974  
33  
No. SAE-740019 ; 1974 ; 38refs  
Availability: In HS-014 709

14 721

## **FUNDAMENTALS OF ELECTRONIC FUEL INJECTION**

Electronic fuel injection of internal combustion engines is discussed as an accurate means of preparing the proper air-to-fuel mixture for the individual cylinders under all operating conditions. Fuel delivery is regulated via several sensors coordinated strategically around the engine which convert physical/measurable quantities, such as engine speed and manifold intake pressure, into proportional electrical signals which are processed by an electronic control unit (ECU). The information required to calibrate the ECU for a given engine is obtained from characterization studies: the data thus acquired are reduced to a matrix which can be described as a three-dimensional control surface. The basic calibration can be modified to enrich the fuel mixture for cold start, warmup, and not engine restart, and transients by means of the temperature and throttle angle sensors.

Gyorki  
ix Corp., Troy, Mich. Electronic Fuel Injection Div.  
HS-014 709, Automotive Electronics, New York, 1974  
44  
No. SAE-740020 ; 1974 ; 3refs  
Availability: In HS-014 709

14 722

## **ELECTRONIC BREAKERLESS INDUCTIVE IGNITION**

Advantages and some of the practical limitations that can be encountered in electronic breakerless inductive storage ignition systems are discussed. Basic principles such as dwell control are explained in detail. Specific conclusions regarding Darlington

coil-switching transistors and current-limiting vari-dwell ignition circuits are drawn.

by H. Weber  
Motorola Semiconductor Products, Inc., Phoenix, Ariz.  
Publ: HS-014 709, Automotive Electronics, New York, 1974  
p245-54  
Rept. No. SAE-740021 ; 1974  
Availability: In HS-014 709

HS-014 723

## **ELECTRONIC SPEED CONTROL**

A second generation automotive speed control system using electronic circuits to perform the necessary logic and memory functions is described. Important considerations, such as performance and environmental factors, are discussed in relation to their design implications. Component function and system operation are covered, using generalized circuit concepts. The unique Philco-Ford electronic speed control system is described in detail.

by W. C. Follmer  
Philco-Ford Corp., Philadelphia, Pa.  
Publ: HS-014 709, Automotive Electronics, New York, 1974  
p255-9  
Rept. No. SAE-740022 ; 1974  
Availability: In HS-014 709

HS-014 724

## **EFFECT OF BLOOD-ALCOHOL LEVEL ON DRIVER PROFICIENCY**

A drunk driving demonstration is reported which dramatized and served to educate the public toward the dangers of operating a motor vehicle at blood-alcohol levels at or beyond the presumptive limits of 10%. Variations of body weights (130, 140, 165, 170, and 242) represented a cross section of the general public and required a considerable spread in the quantity of alcohol consumed by each driver to reach the predetermined levels for a task. There is little doubt that the consumption of alcohol decreased driver performance on psychomotor tests. With the exception of the hand reaction time, there was a definite across the board degradation in performance. In the mental/perceptual ability test, results were less clear cut and less significant. Generally error rate increased and number of items completed decreased as blood alcohol level increased.

by J. M. Clark, Jr.; T. Williamson  
Southwest Res. Inst., San Antonio, Tex. Dept. of Automotive Res.  
1971" ; 40p  
Availability: Corporate author

HS-014 725

## **ACCIDENT AND ECONOMIC ANALYSES OF ACCESS CONTROL ON SEVERAL BYPASSES**

Accident reports were obtained for several Kentucky bypasses and analyzed to determine if they could have been prevented with access control and grade-separated interchanges. Accident cost savings were calculated along with time and operating costs incurred by public. Using a study period of 20 years and uniform-percentage-gradient series present-worth

factor, the present worth of accident savings and time and operating cost savings were calculated; Of 518 accidents on the subject bypasses during the study period, 76.6% were classified as correctable, and these resulted in 86.3% of the injuries and 85.7% of the fatalities. It was shown that injury accidents would be reduced more than property damage accidents because the right angle accident had the greatest accident severity, and would be the most correctable. Generally, signalized intersections had higher benefit-cost ratios because of their high traffic volume. It was shown that it would usually be justifiable to build an interchange at an intersection where a high volume of traffic would have to stop or where a hazardous location could be eliminated;

by K. R. Agent  
Kentucky Dept. of Highways, Lexington  
Rept. No. RR-341; KYP-72-34; HPR-1(8)-pt-3 ; 1972 ; 108p  
23refs  
Availability: Department of Highways, Commonwealth of Kentucky, Frankfort, Ky. 40601

HS-014 726

### **ACCIDENTS ON RURAL INTERSTATE AND PARKWAY ROADS AND THEIR RELATION TO PAVEMENT FRICTION**

Friction measurements were made with a skid trailer at 70 mph on 770 miles of rural, four-lane, controlled-access routes on the interstate and parkway systems in Kentucky. Each construction project was treated as a test section. Accident experience, friction measurements, and traffic volumes were obtained for each. Various relationships between wet-weather accidents and skid resistance were analyzed. The expression of accident occurrence which correlated best with skid and slip resistance was wet-weather accidents per 100 million vehicle miles. Accidents increased greatly as Skid Numbers (70 mph) decreased. Analysis of Peak Slip Numbers and accident occurrences indicated similar trends.

by R. L. Rizenbergs; J. L. Burchett; C. T; Napier  
Kentucky Dept. of Transp., Lexington, Div. of Res.  
Grant KYHPR-64-24  
Rept. No. RR-377; HPR-1(9)-pt-2 ; 1973 ; 58p 10refs  
Prepared in cooperation with the Federal Hwy.  
Administration;  
Availability: Corporate author

HS-014 727

### **DETECTING THE EFFECTIVENESS OF DRIVER RETRAINING AMONG DETROIT CAR COMMUTERS**

The selection of techniques for the evaluation of a driver re-training program provided for Detroit employees of Ford Motor Company is discussed. Program participants were 1,052 employees who accepted the invitation to participate. These were divided into four groups. Three of these groups received training at three different levels of intensity. The fourth group was a control. Attention is drawn to the poor state-of-the-art of intermediate evaluation approaches, which are needed because accident and related data are inadequate to demonstrate the success of driver re-training. A causal chain model for selecting an adequate set of intermediate instruments is

described, together with its application to Ford's re-training program.

by M. E; Lee  
Michigan Univ., Ann Arbor; Hwy. Safety Res. Inst.  
1973 ; 18p 18refs  
Sponsored by the Ford Motor Co., Dearborn, Mich. Presented at the British Universities Transport Study Group Conference, 4 Jan 1973, Univ. Col, London, Res. Group in Traf. Studies.  
Availability: Corporate author

HS-014 728

### **THERMOFORMED PLASTIC STRUCTURES AS ENERGY ABSORBING MEDIA**

The development of low-cost thermoformed polymer structures as a possible candidate for the energy management medium, especially as applied to bumpers is discussed. It was found that truncated pyramids gave the best results of the thermoformable shapes tested, on the basis of energy absorption and recovery. Pyramid patterns, material selection, and testing are described. Results show that assembled layers of intermeshed pyramids serve as an excellent energy management medium. Such media have been made of polyethylene, ethylene-vinyl acetate copolymers, and a specially developed blend of polyethylene and ethylene-propylene rubber. Impacts at 5 mph show good energy absorption and recovery. Tests run at -10 degrees f show small increases in stress levels encountered.

by Rh. Salloum  
General Motors Res. Labs., Warren, Mich.  
1974 ; 21p 8refs  
Presented at the Society of Plastics Engineers meeting, Detroit, 12 Nov 1974. Movie presented with report.  
Availability: Corporate author

HS-014 729

### **MODEL PROGRAMS IN PEDESTRIAN AND BICYCLE SAFETY FOR WISCONSIN COMMUNITIES**

A guide to assist communities reduce the annual toll of bicycle and pedestrian injuries and deaths in Wisconsin is presented; A section on organization for safety deals with community safety organizations, accident records systems, retroreflective materials, and motor vehicle operator practices; Pedestrian programs include: pedestrian ordinance, the pedestrian accident problem, safety rules, older adults safety engineering, safest route programs, Safety Town, and Helping Hand; Bicycle programs include: bicycle ordinance; the problem types; safety rules; signs and signals; selection, equipment and maintenance; registration and licensing; skills test; rodeos; bicycle court; lanes paths, and routes; and a bicycle lock-up campaign.

by J. L; Hurley; R. L. Thompson  
Wisconsin Univ., Whitewater. Dept. of Safety Education  
1973 ; 91p 60refs  
Prepared for the Wisconsin State Div. of Hwy. Safety Coordination;  
Availability: Wisconsin Div. of Highway Safety Coordination, Rm 1121, State Office Bldg. 1 W. Wilson St., Madison, Wis. 53702

HS-014 730

## **MICHIGAN'S STATEWIDE TRANSPORTATION ANALYSIS MODEL. GRAPHIC DISPLAY OF ACCIDENT DATA**

Techniques available to the Michigan Statewide Forecasting Model which graphically display accident data are explained; The methods are not limited to accident data and could be used to overview large amounts of other highway-related data. Selected accidents involving a wet surface were matched with the highway links in the model, and the number of accidents and accident rate were computed and plotted for each link in the Statewide Forecasting Network.

by A. R. Friend  
Michigan Dept. of State Highways, Lansing  
1972 ; 18p  
Prepared in cooperation with the Federal Hwy.  
Administration.  
Availability: Corporate author

HS-014 731

## **STATEWIDE TRANSPORTATION MODEL MULTIPLE APPLICATIONS: AMBULANCE SERVICE-AREA ANALYSIS**

The Michigan Statewide Transportation Modeling System is applied to the evaluation of emergency ambulance services for the state, and its reversibility is demonstrated by viewing the data from a highway planning perspective. The report was completed using a 1965 highway network as a basis, but the impact of proposed highways on ambulance facilities could have been undertaken. The system presented allows information from many different agencies to be used to solve problems. Over 50 socioeconomic categories of information are available.

by A. R. Friend  
Michigan Dept. of State Highways and Transp., Lansing  
1974 ; 29p  
Availability: Corporate author

HS-014 732

## **STATEWIDE PROJECT REPORT: PROXIMITY OF AUTOMOBILE INJURY ACCIDENTS TO HOSPITALS, PART A**

A Proximity Analysis process is described which is used to determine the number of injury accidents occurring within specified driving times of each of Michigan's general-purpose hospitals. The method allows both transportation and health-care planners to test various solutions to health-care problems. The cooperation may decrease duplication of efforts within state government and have the ultimate result of conserving resources of money and personnel. The analysis method is documented and each type of output introduced.

by A. Friend; T. Gotts  
Michigan Dept. of State Highways, Lansing  
1973 ; 31p  
Prepared in cooperation with the Federal Hwy.  
Administration.  
Availability: Corporate author

HS-014 733

## **HANDBOOK FOR INSTALALTION AND INSPECTION STATIONS. LAMP ADJUSTING**

A lamp adjusting handbook for installation and inspection stations is presented, with three major areas of emphasis: licensing of official stations, licensing of official lamp adjusters, and lamp adjusting procedures. Specific areas covered include: authorization of official lamp adjusting stations, station requirements, license fees and term of license, transactions involving station license, classes and scope of official lamp adjusters licenses, licensing of adjusters, disciplinary actions, approved aiming and lighting equipment, headlamp aiming procedures, method: of aiming, proper mounting, public relations, and clearance of enforcement documents. Annexes include excerpts from: business and professions code and health and safety code, California administrative code, and vehicle code relating to lighting equipment.

California Bureau of Automotive Repair, Sacramento  
Rept. No. BAR-H-003 ; 1973 ; 82p  
Availability: Bureau of Automotive Repair, 2815 "O" St.,  
Sacramento, Calif. 95816 \$2.00

HS-014 734

## **MEASUREMENT OF WHEELPATH WEAR ON WISCONSIN HIGHWAYS. A PERSPECTIVE AFTER FOUR YEARS OF MEASURING PAVEMENT WEAR**

Semi-annual measurements of pavement wear made in Wisconsin during four years have shown a pattern of wear progressing each winter and leveling off each summer. The seriousness of this abrasive wearing of the wheelpaths by studded winter tires is cited in terms of resurfacing needs for the heavily travelled freeways in Milwaukee, the detrimental effect on pavement skid resistance, and the obliteration of safety grooving. Based on parking lot surveys conducted each winter, the damage that has already occurred is attributed to the less than one quarter of the motorists who have used studded tires on their vehicles. This evidence of the damaging effects of studded tires leads to the recommendation that these tires be banned from use in Wisconsin.

Wisconsin Dept. of Transp., Madison  
1973 ; 23p 4refs  
Availability: Corporate author

HS-014 735

## **FLYWHEEL DRIVE SYSTEMS STUDY. FINAL REPORT**

Detailed input information on engine emissions on transmission characteristics is examined, augmented by flywheel technology studies and test results to provide the background for conclusions regarding the flywheel drive concept. The results indicate that the flywheel hybrid drive concept is a technically feasible propulsion system for a full size automobile. The report describes the work done to accomplish several goals: advance the development of flywheel systems technology including designs on conformal housing bearings, seals, and evacuation systems; demonstrate positive flywheel energy containment; formulate safety analyses; produce engine-mapping project data to permit calculation of engine emission data resulting from flywheel drive operations over the Urban



HS-014 736

Dynamometer Driving Schedule; and provide systems coordination in the areas of flywheel assembly designs, interface configuration tradeoffs, speed selections, cost, and performance.

by R. R. Gilbert; G. E. Heuer; E. H. Jacobsen; E. B. Kuhns; L. J. Lawson; W. T. Wada  
Lockheed Missiles and Space Co., Inc., Sunnyvale, Calif.  
Ground Vehicles Systems  
Contract EPA-68-04-0048  
Rept. No. LMSC-D246393; PB-213 342; APTD-1182 ; 1972 ;  
292p 10 refs  
Sponsored by the U. S. Environmental Protection Agency.  
Availability: NTIS \$3.00

HS-014 736

### **THE INCIDENCE OF HAZARDOUS MATERIAL ACCIDENTS DURING TRANSPORTATION AND STORAGE; FINAL REPORT**

One of a series describing background research on the incidence of abnormal loading, the report is organized in terms of modes of hazardous material transportation and storage. These modes--pipeline, water, motor vehicle, and railroad transportation systems--are addressed in four sections, with storage systems discussed in a fifth. The sections depend on the amount of available data, rather than the risk involved in an accident. Results are summarized, showing generally that there is little empirical evidence to substantiate a threat to buildings from hazardous materials transport. However, trends in volumes shipped in proximity to structures of interest raises the prospect of future incidents.

by W. A. Steele; D. Bowser; R. E. Chapman  
National Bureau of Standards, Washington, D. C.;  
Rept. No. NBSIR 73-412; COM-74-10512 ; 1973 ; 41p 20refs  
Availability: NTIS

HS-014 737

### **ALDEHYDE AND REACTIVE ORGANIC EMISSIONS FROM MOTOR VEHICLES. PT. 2--CHARACTERIZATION OF EMISSIONS FROM 1970 THROUGH 1973 MODEL VEHICLES. FINAL REPORT**

Aldehyde and reactive organic emissions from 1970 through 1973 model vehicles were characterized, and data were provided to compare exhaust hydrocarbon reactivity for exhaust from those vehicles with that of exhaust from prototype low-emission systems. Engineering data were obtained on the emission characteristics of 10 production vehicles using the 1975 Federal test procedure. Exhaust emission levels for those vehicles are cited for carbon monoxide, hydrocarbons, oxides of nitrogen, aldehyde emissions, and the molar HC reactivity of the exhaust from the 40% aromatic fuel, thermal reactor and oxidation catalyst, and the dual catalyst vehicles.

Bureau of Mines, Bartlesville, Okla.  
Rept. No. APTD-1182 ; 1972 ; 41p 20 refs

HS-014 738

### **COST AND EMISSION STUDIES OF A HEAT ENGINE/BATTERY HYBRID FAMILY CAR**

An experimental and analytical study investigated the performance of series and parallel configured heat engine/battery hybrid family cars: the definition of the relative efficiency weight and costs of hybrid power trains; data characterization of selected three-component catalysts preliminary material screening and development of a hydrocarbon emission accumulator (hydrocarbon accumulator). The ability of a hybrid car with internal combustion engine to meet the 1975-76 emission standards is demonstrated.

by G. H. Gelb; B. Berman; E. Koutsoukos  
TRW Systems Group, Redondo Beach, Calif.  
Contract EPA-68-04-0058  
Rept. No. TRW-21054-6001-R0-00; APTD-1355; PB-213 28  
1972 ; 265p 4refs  
Prepared for the U. S. Environmental Protecting Agency.  
Availability: NTIS \$3.00

HS-014 739

### **COMMUNICATION SYSTEM HANDBOOK FOR STATE HIGHWAY DEPARTMENTS. FINAL REPORT**

A handbook is presented to assist state highway officials in the planning and implementation of an integrated communication system in support of all highway functions which include planning, design, construction, maintenance, operation, and administration of the highway system. Specific chapters cover communication system management, composite conditions, the requirements model, and computer processing. Appendices provide a data base and an illustrative study of Peoria, Illinois.

by M. Douglas  
Computer Sciences Corp., Paramus, N. J.  
Contract FH-11-7341  
Rept. No. CSC-71-599; FHWA-RD-73-27; PB-224 686 ; 1974  
Prepared in cooperation with the Ill. Div. of Hwys.  
Availability: NTIS \$4.50

HS-014 740

### **CATALYSTS FOR AUTOMOTIVE POLLUTION CONTROL DEVICES. FINAL REPORT**

Various catalysts to control nitrogen oxide, carbon monoxide and hydrocarbon emissions from motor vehicle engines were studied; Catalysts tested included rare earth and transition metal oxides, noble metals, Monel, tungsten bronzes, and stainless steel. The best catalysts were exposed to exhaust gases from a dynamometer mounted engine, in a small reactor under simulated oxidizing or reducing conditions. Several catalysts were also tested in a prototype two-stage converter. A strontium yttrium ruthenium oxide in the first stage reduced NO emissions 90%; ruthenium and ruthenium oxides selected

catalyst in the second stage totally removed CO for at least 150 hours.

by K. Nobe; G; L. Bauerle  
California Univ., Los Angeles. School of Engineering and Applied Science  
Contract PCA-189  
Rept. No. ARB-R-PCA-189-73-02; UCLA-ENG-7371; PB-229 351 ; 1973 ; 166p 27refs  
Sponsored by the Air Resources Board of the State of Calif.  
Rept. for May 1971 - Jun 1973. Continues work performed in 1970 under Project Clean Air, Univ. of Calif., Project S-2  
Availability: NTIS

HS-014 741

## **EVALUATION OF TRAFFIC ACCIDENT EXPERIENCE FOR COUNTERMEASURE PROGRAM PLANNING. FINAL REPORT**

A model is presented which identifies accident problem areas on the basis of past accident experience. Using exposure normalized accident statistics, key problem counties in Michigan are identified both by relative differences in county's accident experience and by relative change of accident involvement within each county from 1966 to 1971. The technique is a categorization of counties on some basis, such as those above the state average versus those below the average, and then plotting the respective categories by appropriate map designations. Categorizations of above average and increasing, above average and decreasing, below average and increasing, and below average and decreasing were plotted. Case studies of selected counties can be undertaken to identify candidate countermeasure applicationsmdelay of computer implementation of the model is recommended pending operational utility review.

by D. K. Damkot; W. T. Pollock  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Rept. No. HSRI-320139-1; PB-228 682 ; 1973 ; 144p 3refs  
Prepared for the Michigan Office of Hwy. Safety Planning and NHTSA.  
Availability: NTIS

HS-014 742

## **SAE AND ISO VEHICLE IDENTIFICATION NUMBER PROGRAMS**

The use of a vehicle identification number (VIN) assigned to a vehicle by the manufacturer for registration and titling of the vehicle is discussed, with emphasis on the vagueness of related state laws, and on the need for guidelines. Such guidelines as developed by the Society of Automotive Engineers (SAE) are described for passenger cars, recreational vehicles, and motorcycles; National and international concerns for the problem are cited. A uniform international VIN system applicable to all land vehicles, based on the SAE system of descriptors and indicators, and including identification for the country of origin, is developed.

by M. W. Dixon  
General Motors Corp., Warren, Mich.  
1974 ; 12p  
Presented at the International Assoc. of Chiefs of Police, Auto Theft Committee, Mid-Year Meeting, Chicago, 26 Apr 1974.  
Availability: Corporate author

HS-014 743

## **WRONG-WAY DRIVING MANEUVERS ON THE INTERSTATE AND PRIMARY SYSTEMS OF VIRGINIA**

Wrong-way driving maneuvers were studied for six months on the interstate and primary highways of Virginia via state police surveillance. Of the 38 reported incidents on the interstate systems about 68% did not result in an accident. Listings and a map are given showing the location of wrong-way driving incidents by routes, counties, and districts, along with data summaries. Similar data are given for the 81 reported incidents on divided primary routes, of which approximately 77% did not result in a crash. It is shown that the problem is much more widespread than anticipated. Results show the number of incidents occurring at interchanges, day of week, driver age and race, vehicle type, weather conditions, and distances traveled in the wrong direction.

Virginia; Dept. of Highways, Richmond; Virginia. Dept. of State Police, Richmond  
1973 ; 37p  
Availability: Corporate author

HS-014 744

## **AN EVALUATION OF THE MICHIGAN TRIAL SUBSTITUTE MOTOR VEHICLE INSPECTION PROGRAM. FINAL REPORTVOL. 2: TECHNICAL**

The effectiveness of an on-road, spot check method of conducting vehicle inspections is examined. A study concentrated on an enhanced program which was operated in three Michigan counties. The proportion of the vehicle population inspected was varied. Independent measurements were collected on vehicle condition, through a random sample of 6000 vehicles which were given a full inspection; 43,000 were observed for lighting, outages and 5500 drivers were interviewed. For a six-month observation period, a 5-10% reduction in defects was obtained in the area with the heaviest concentration of inspection activity. Driver interviews showed no decrease in public acceptance of the program with increased police effort; Follow-up procedures were found to be quite effective in obtaining the repair of defective vehicles;

by J. S. Creswell, Jr.  
Michigan Univ., Ann Arbor, Hwy. Safety Res. Inst.  
Rept. No. UM-HSRI-SA-74-1 ; 1974 ; 338p 34refs  
Rept. for 1 May 1972 - 31 Dec 1973. Sponsored by the Michigan Dept. of State Police and the Office of Hwy. Safety Planning.  
Availability: NTIS

HS-014 745

## **EVALUATION OF FORD EMPLOYEE SKILLED DRIVING PROGRAM. VOL. 1: SUMMARY. VOL0: TECHNICAL REPORT. FINAL REPORT**

The Ford Co, multi-phase program of research and development in driver improvement and licensing is described. Phase I of the project examined the effectiveness of a set of training procedures designed for unexceptional drivers and tested the feasibility of offering such a program for the employees of a large corporation. The program is assessed in terms of experimental format, evaluation model and testing techniques, and

HS-014 746

### **DRIVER CHARACTERISTICS AFFECTING VEHICLE CONDITION AND RESPONSE TO A MOTOR VEHICLE INSPECTION PROGRAM**

Interviews conducted with 5500 drivers in the Michigan Checklane Evaluation Program are examined. Four areas were probed in detail: operator characteristics affecting vehicle condition; the extent of public knowledge about the Michigan vehicle inspection program; driver reactions to the checklane procedures; characteristics of the sample population. Results included the finding that owner characteristics such as age and income strongly affected vehicle condition as well as responses to the checklane. Public knowledge of the lane's operation was limited, but roughly comparable to similar studies. The sample methodology yielded a highly representative picture of the population.

by J. S. Creswell, Jr.  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
1974 ; 15p 9refs  
Reprinted from HIT Lab Reports v4 n5 p1-9 (Jan 1974).  
Availability: Corporate author

HS-014 747

### **PASSENGER CAR AND TRUCK SIGNALING AND MARKING RESEARCH: 1. REGULATIONS, INTENSITY REQUIREMENTS AND COLOR FILTER CHARACTERISTICS**

Automobile and truck marking and signaling are examined in a summary of current lighting standards. Reviews suggest several topics that warrant further consideration, such as area-intensity relationships of stop and turn lamps, the hazard warning (four-way flashing) signal being rendered inoperative if the brake pedal is depressed, reduced photometric and location requirements of rear turn signals on tractors, tractor clearance lamps indicating cab width rather than the width of the vehicle, the adoption of side turn signal lamps, etc. A review of the effectiveness of separation of rear marking and signal lamps by their functions, supports the general concept. It is shown that signals should become identifiable at distances up to 2000 feet, and that signal intensity requirements are affected by the system's configuration.

by R. G. Mortimer; C; D. Moore, Jr.; C. M. Jorgeson; J. K. Thomas  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Contract UM7101-C128  
Rept. No. UM-HSRI-HF-73-18; PB-225 169/2 ; 1973 ; 362p  
50refs  
Sponsored by the Motor Vehicle Mfrs. Assoc., Detroit, Mich.  
Availability: NTIS \$20.00

urban intersection demonstrates that, if the source is backwind area formed on the downwind side of the building, both experimental and measured concentrations are due to the action of air pockets. As the number of vehicles increases, pollution concentrations go up, and carbon monoxide concentrations of about 52 ppm are forecast if 10,000 vehicles pass every hour; The number of vehicles allowed to pass should be 4000-5000 vehicles per hour. Specific problems to be resolved are cited which the effectiveness of wind tunnel experiment analysis as a relation method.

by T. Odaira; K. Asakuno; S. Fukuoka; M. Udagawa; S. Izumikawa; M. Funesima; M. Ito; H. Yokota; K. Nishio  
Yamamoto  
Kyoto Univ(Japan)  
Rept. No. APTIC-57002; TR.38A-74; N74-15335 ; 1974 ; 16refs  
Availability: NTIS \$3.00

HS-014 749

### **AUTOMOBILE EXHAUST EMISSION MODAL ANALYSIS MODEL**

A mathematical model of an automobile's emission is described which can be used to calculate the amount of hydrocarbons, carbon monoxide, and oxides of nitrogen emitted by individual vehicles or groups of vehicles over arbitrary driving sequences. The model requires as input the amounts of the three pollutants emitted by individual automobiles over short duration driving sequences; It is intended to be used to predict emissions from vehicles operated within the ranges of speed and acceleration contained in the input emission data. The validity of the model has been investigated by predicting sections of the Federal Test Procedure and comparing predicted and actual values.

by P. Kunselman; H. T. McAdams; C. J. Domke; M. E. Williams  
Calspan Corp., Buffalo, N. Y.  
Contract EPA-68-01-0435  
Rept. No. EPA-460/3-74-005; PB-229 635 ; 1974 ; 166p 4r  
Sponsored by U.S. Environmental Protection Agency, Seattle  
was prepared by EPA personnel.  
Availability: NTIS

HS-014 750

### **THE STATE OF THE ART OF NONDESTRUCTIVE TESTING OF TIRES. FINAL REPORT**

Results of a tire testing survey are presented, based on literature search, visits to military and DOT installation, National Bureau of Standards, tire rebuilders, tire test equipment manufacturers, test tracks, and new tire manufacturers. The report shows that: only limited use is being made of destructive testing; the high cost of mechanical testing of

ing tire technology presents a continuing challenge to destructive testing practitioners.

E. J. Vogel  
Materials and Mechanics Res. Center, Watertown,  
No. AMMRC-PTR-73-9; AD-774 188 ; 1973 ; 66p  
ared for the U, S; Army Material Command, Alexandria,  
ability: NTIS

#### 14 751 DEVELOPMENT OF LOUVERED SIGNS TO REDUCE LOAD; FINAL REPORT

louvered sign background of light gauge aluminum sheet,  
ated by standard sheet metal techniques, was developed  
compared with a standard sign, Wind load reductions of  
ximately 50% were attained in the direction normal to  
sign face with a typical legend in place. Lateral wind re-  
ce was approximately equal to normal wind resistance.  
ometric and observer evaluation of the louvered  
ground showed adequate legibility and contrast. Reflec-  
ed sheeting applied to the louvered surfaces gave poor  
s because of the angles involved, and the panel would be  
expensive when compared to standard signs; Although  
al wind loads are reduced, lateral forces and dead-load  
increased. The effect of ice load on the larger surface  
along with constriction of the louver passages by ice and  
, are not determined.

Michigan Dept. of State Highways, Lansing  
No. RRR-821 ; 1973 ; 33p 5refs  
ared for the Michigan State Hwy. Commission in  
eration with the U; S. Dept. of Transp., Federal Hwy,  
in;  
ability: Corporate author

#### 14 752 FACTORS AFFECTING VEHICLE FUEL ECONOMY

factors which have contributed to the fuel economy  
ne of the typical car are shown to be average weight and  
e displacement increases and measures taken to reduce  
ust emissions. As of the 1973 model year, emission con-  
have accounted for 60% of the total 22% decline in fuel  
omy based on Ford's city-suburban route.

LaPointe  
Motor Co., Dearborn, Mich.  
No. SAE-730791 ; 1973 ; 12p 6refs  
nted at the National Combined Farm, Construction and  
trial Machinery and Fuels and Lubricants Meetings,  
aukee, 10-13 Sep 1973.  
ability: SAE

#### 14 753 VEY OF ALCOHOL INVOLVEMENT IN FATAL OR VEHICLE ACCIDENTS IN CANADA 1972

d 12Based on preliminary statistics, the extent of alcohol  
vement in Canadian motor vehicle fatalities is examined.  
are presented which show that alcohol is a significant

cohol involvement, blood alcohol levels, driver age, registra-  
tions, and pedestrian fatalities.

Traffic Injury Res. Foundation of Canada, Ottawa, Ont.  
Rept. No. TIRF-1; Issue-1 ; 1974 ; 12p  
Availability: Corporate author

HS-014 754

#### JUDGMENT OF VEHICLE SPEEDS AND TRAFFIC PATTERNS. FINAL REPORT

The ability of drivers to estimate their own and other vehicles'  
absolute and relative speeds, their knowledge of highway strip-  
ing as it relates to the lawfulness of passing, their judgmental  
ability to determine the safety of passing on a mountainous  
road, and their reactions to an experimental "no passing zone"  
sign is examined. This ability, knowledge and judgment is  
compared among three types of presentation: 16mm motion  
picture films, the UCLA Driving Simulation Laboratory  
(DSL), and actual on-the-road (field) tests. Conclusions are:  
older drivers tend to underestimate speeds while younger  
drivers overestimate; speed estimations are influenced by  
posted speed limit signs; speed estimations are highly con-  
sistent within a segment but have little relationship between  
one segment and another; drivers overestimate speeds on  
freeways and underestimate on rural roads; drivers show a  
high degree of accuracy as to the lawfulness of passing; a pen-  
nant-shaped "no passing zone" sign posted on the left side of  
the road lengthens the no passing zone; drivers' relative speed  
judgments are very accurate; drivers overestimate speed when  
using audio cues alone, and underestimate when using visual  
cues alone; drivers are very accurate in estimating specific  
speeds, but are extremely poor in estimating proportional  
speeds (half, double, etc.); on the road, drivers not controlling  
the car estimate slower speeds than when they are driving;  
drivers' speed estimates are most accurate on the road, less ac-  
curate in the DSL, and least accurate with 16mm film projec-  
tion.

by J. Beers; S. Hulbert  
California Univ., Los Angeles, Inst. of Transp. and Traf.  
Engineering  
Contract B-2-8  
Rept. No. UCLA-ENG-7281; PB-218 925 ; 1972 ; 146p 40refs  
Prepared in cooperation with the Federal Hwy.  
Administration. Sponsored by the California Business and  
Transp. Agency, Sacramento.  
Availability: NTIS \$3.00

HS-014 755

#### ENGINEERING KNOW-HOW IN ENGINE DESIGN. LUBRICATION--PUMP TO SUMP

Four lectures on engineering know-how in engine design are  
presented on: diesel engine lubrication; influence of lubrication  
system variables on sleeve bearing performance; engine  
lubricating oil filtration; and the quality of universal engine  
oils.

Society of Automotive Engineers, Inc., New York  
Rept. No. SAE-SP-390 ; 1974 ; 62p refs  
Includes HS-014 756--HS-014 759. Sponsored by the  
Milwaukee Sec., Society of Automotive Engineers.  
Availability: SAE

described in their various stages of development. The influence of lubricant on engine performance or ring action is examined, and current oil-related problems such as ring belt deposits and ring sticking, oil consumption, and valve train wear are discussed. The question of oil-drain period is also reviewed. Current research efforts concerning the development of a universal diesel fuel and the evaluation of test results are considered.

by J. A. MacLean  
Caterpillar Tractor Co., Peoria, Ill.  
Publ: HS-014 755, Engineering Know-How in Engine Design,  
New York, 1974 p1-17  
Rept. No. SAE-740516 ; 1974 ; 14refs  
Availability: In HS-014 755

HS-014 757

### **INFLUENCE OF LUBRICATION SYSTEM VARIABLES ON SLEEVE BEARING PERFORMANCE**

Sleeve bearing parameters of back temperature, minimum oil film thickness, and peak oil film pressure are examined as they are affected by oil flow, oil cleanliness, viscosity, sump temperature, and oxidation resistance. The mechanical properties required in a sleeve bearing material and the critical factors in the geometric design of the bearing are studied, along with the housing into which the shell fits and the shaft which the bearing supports. General rules and standards for optimizing bearing life are presented, as is an appendix consisting of a bearing failure handbook.

by W. A. Yahraus  
Gould, Inc., Cleveland, Ohio. Clevite Engine Parts Div.  
Publ: HS-014 755, Engineering Know-How in Engine Design,  
New York, p18-37  
Rept. No. SAE-740517 ; 1974 ; 3refs  
Availability: In HS-014 755

HS-014 758

### **ENGINE LUBRICATING OIL FILTRATION: A PARADOX OF VARIABLE CONSTANTS**

General filter requirements are discussed along with the four basic filtration systems for engine lubricating oil. Filtration methods and types, and the application of a filter to an engine lube system are also described. A sample filtration analysis is presented along with graphical laboratory data.

by W. G. Nostrand  
Nelson Muffler Corp., Stoughton, Wis.  
Publ: HS-014 755, Engineering Know-How in Engine Design,  
New York, 1974 p38-46  
Rept. No. SAE-740518 ; 1974 ; 17refs  
Availability: In HS-014 755

two of the oils tested, it was concluded that: a universal oil meeting the lubricant specifications for all diesel and gasoline engines gave excellent performance in customer use; oil gave equal or better performance than a low-ash, low-sulfur, cycle nonturbocharged engines, and probably in 2-cycle nonturbocharged engines; universal oil gave improved performance in 4-cycle nonturbocharged engines compared to the oil; universal oil gave excellent performance in gasoline delivery trucks; and universal oils are prime-quality oils meeting the needs of fleets operating gasoline and diesel powered vehicles.

by D. H. Olson  
Shell Devel. Co., Torrance, Calif.  
Publ: HS-014 755, Engineering Know-How in Engine Design,  
New York, 1974 p47-58  
Rept. No. SAE-740519 ; 1974 ; 30refs  
Availability: In HS-014 755

HS-014 760

### **U. S. DEPARTMENT OF TRANSPORTATION PROGRAM OF TRANSPORTATION RESEARCH UNIVERSITIES**

Seven papers on transportation research are presented with: objectives, organization, and progress of the research; mobility of people and goods in the urban area; a measurement of highway-induced changes in population density, and minority business opportunities for transportation to fulfill human needs in the rural/urban area; a comprehensive transportation research program in Virginia; interregional analysis of U. S. freight shipment; an integrated engineering-planning approach to the problem of transportation, improvement, and replacement of elevated transportation structures.

Society of Automotive Engineers, Inc., New York  
Rept. No. SAE-SP-389 ; 1974 ; 54p refs  
Includes HS-014 761--HS-014 767.  
Availability: SAE

HS-014 761

### **THE PROGRAM OF UNIVERSITY RESEARCH OBJECTIVES, ORGANIZATION, AND PROGRESS TO DATE**

The U. S. Department of Transportation Program of University Research aims to focus interdisciplinary research on the various phases of transportation problems. This involves the participation of economists, geographers, demographers, city planners, behavioral scientists, as well as technologists. The views of our universities will be needed to help us understand the complex, critical relationships between transportation and the society it serves. This paper outlines the objectives of the Program and DOT's philosophy in granting contracts to universities. In contrast to many other programs, in

the federal government is the sponsor of the research - the "customer" is the transportation communities. Thus, proposals involve a high degree of commitment between the universities and their local transportation communities.

by R. H. Cannon, Jr.  
Department of Transportation, Washington, D. C.  
Publ: HS-014 760, U. S. Department of Transportation  
Program of Transportation Research in Universities, New  
York, 1974 p1-4  
Rept. No. SAE-740023 ; 1974  
Availability: In HS-014 760

HS-014 762

### **MOBILITY OF PEOPLE AND GOODS IN THE URBAN ENVIRONMENT--A STATUS REPORT**

Research in progress under the Polytechnic Institute of New York's contract with DOT is presented, including student involvement and interdepartmental participation. The research is focused in two topic areas in what was proposed as the first year of funding: mobility of the aged and handicapped, and facilitation of urban goods movement. Research objectives, current status, and directions are discussed.

by L. J. Pignataro; K. W. Crowley; W. R. McShane  
Polytechnic Inst., Troy, N. Y.  
Publ: HS-014 760, U. S. Department of Transportation  
Program of Transportation Research in Universities, New  
York, 1974 p5-11  
Rept. No. SAE-740024 ; 1974 ; 1ref  
Availability: In HS-014 760

HS-014 763

### **A MEASUREMENT OF HIGHWAY-INDUCED CHANGES IN LAND USE, POPULATION DENSITY, AND MINORITY BUSINESS OPPORTUNITIES**

The impacts of locating and operating highways and other transportation facilities in disadvantaged, minority neighborhoods are examined. The major impact areas are the changes in land use, population and residential densities, and the growth and development of minority business enterprises. A partially completed baseline inquiry reveals that the study area has been developed in a piecemeal manner, evidenced by the existence of large tracts of undeveloped land, a mixture of light industrial and commercial activities with residential neighborhoods, and the fact that a high proportion of the local streets are dead-end and poorly maintained. The area is low in population density, the housing is largely single-family, with about one-third substandard. Data are described for later comparison in the impact assessment to give insight for developing remedial community planning approaches.

by R. Steptoe  
Southern Univ., Baton Rouge, La.  
Publ: HS-014 760, U. S. Department of Transportation  
Program of Transportation Research in Universities, New  
York, 1974 p12-22  
Rept. No. SAE-740025 ; 1974 ; 16refs  
Availability: In HS-014 760

HS-014 764

### **TRANSPORTATION TO FULFILL HUMAN NEEDS IN THE RURAL/URBAN ENVIRONMENT**

Background and initial funding on a multidisciplinary program within the DOT University Research Program are presented, considering transportation problems involving urban and rural travelers, with particular emphasis on the Dallas-Fort Worth Regional Airport. Work includes: evaluation transportation problems related to providing essential services to rural and urban dwellers; study of the effect of interurban transportation systems on the rural environment; study of the movement of goods and freight; development of methodologies for considering human response to the quality of ride and service in developing criteria for various transportation modes; and study of human response in developing methods of evaluating possible modal choice decisions in both urban and rural areas. Preliminary results are reported which indicate the potential of multidisciplinary university research.

by W. R. Hudson; C. M. Walton  
Texas 05Texas Univ., Austin  
Publ: HS-014 760, U. S. Department of Transportation  
Program of Transportation Research in Universities, New  
York, 1974 p23-32  
Rept. No. SAE-740026 ; 1974 ; 11refs  
Availability: In HS-014 760

HS-014 765

### **A COMPREHENSIVE TRANSPORTATION RESEARCH PROGRAM FOR THE COMMONWEALTH OF VIRGINIA**

A program has been initiated to bring together the talents and interests widely scattered throughout the academic institutions of Virginia and provide a mechanism for interaction with state officials and agencies directly concerned with transportation and with other problems related to transportation. A Steering Committee has been formed to serve as a focal point for this activity. Membership includes representatives from the state government, including the Secretary for Transportation and Public Safety, from local and regional groups within the state, and from the academic institutions. The ultimate goal for this Committee is to develop a well coordinated program of research, study, and demonstrations utilizing the talents and facilities in the state to assure that the state's problems are being explored from the broadest possible viewpoint and that Virginia is keeping abreast of the rapidly changing picture in all fields of transportation.

by J. W. Dickey; A. R. Kuhlthau  
Virginia Polytechnic Inst. and State Univ.; Virginia Univ.,  
Charlottesville  
Publ: HS-014 760, U. S. Department of Transportation  
Program of Transportation Research in Universities, New  
York, 1974 p33-8  
Rept. No. SAE-740027 ; 1974  
Availability: In HS-014 760

HS-014 766

### **INTERREGIONAL ANALYSIS OF UNITED STATES FREIGHT SHIPMENTS**

technique of analysis that can be used for many different regional economic studies. To illustrate its use, a description is given of its application in an analysis of the regional and industrial interrelationships between the transportation and energy sectors of the economy.

by K. R. Polenske  
Massachusetts Inst. of Tech., Cambridge  
Contract DOT-OS-30104  
Publ: HS-014 760, U. S. Department of Transportation  
Program of Transportation Research in Universities, New York, 1974 p39-43  
Rept. No. SAE-740 028 ; 1974 ; 11refs  
Availability: In HS-014 760

HS-014 767

### **AN INTEGRATED ENGINEERING-PLANNING APPROACH TO THE PRESERVATION, IMPROVEMENT, AND REPLACEMENT OF ELEVATED TRANSPORTATION STUDIES**

Considerations surrounding the community acceptance of elevated railroad and rapid transit structures are outlined. Such factors are covered as: type of neighborhood affected, land use, traffic surveys, urban renewal plans, and environmental considerations. Particular emphasis is placed on methods of improving existing elevated structures: evaluation of the physical condition and load-carrying ability of the structure, need for structural repairs, and improved analysis techniques. Computer modeling techniques are applied. It is shown that through use of these techniques, the transit operator can more accurately plan renewal programs to reflect the community's needs.

by M. L. Silver; T. B. Belytschko; M. Gelick  
Illinois Univ., Chicago  
Publ: HS-014 760, U. S. Department of Transportation  
Program of Transportation Research in Universities, New York, 1974 p44-51  
Rept. No. SAE-740029 ; 1974 ; 11refs  
Sponsored by the Department of Transp.  
Availability: In HS-014 760

HS-014 768

### **LASER GAUGE TIRE DIMENSIONAL MEASUREMENT SYSTEM**

A laser-optical system for measuring tire tread depths for treadwear analysis is described. Other tire dimensional parameters that can be measured include the outside diameter, section width, and rib or groove runout of the tire. This non-contact measuring system provides individual rib height information instead of an average groove depth. A cross-sectional profile of the tread can also be generated on an X-Y plotter. A minicomputer is used for both machine control and data acquisition. The programming capability provides much flexibility in measuring depths on various tread designs and in defining rib heights. The system is evaluated in terms of gauge accuracy, system repeatability, comparison with hand measurements, and problems encountered with tread geometries and states of tire wear.

by D. G. Anderson; H. H. Hoffman  
GOODYEAR Tire and Rubber Co., Akron, Ohio  
Rept. No. SAE-740070 ; 1974 ; 13p  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.

HS-014 769

### **AFTER STUDS IN MINNESOTA**

Observed effects of studded tires were examined over several winters on various types of roads and streets to ascertain the proportion of time that icy cover conditions prevailed when studded tires could have some beneficial effect. Up to 4,000 such observations were made in the winter of 1971-72 when the tires were prohibited in Minnesota. Icy conditions prevailed no more than 1% of the time in the metropolitan area on predominantly high-volume and high-speed roads, more frequently on low-volume and low-speed roads and streets. Traffic accident data were compared for the season with the three preceding winters when studs were legalized. For snowy or icy roads, the winter without studs compared favorably with the previous winters with studs; there was no appreciable increase in traffic accidents, and noise levels of pavements badly worn by studs were doubled.

by C.K. Preus  
Publ: Highway Research Record n477 p11-5 (1973)  
1973  
Availability: See publication

HS-014 770

### **WINTER ACCIDENT EXPERIENCE IN ONTARIO WITH AND WITHOUT STUDED TIRES**

Total collision and personal injury accidents on the highways of Ontario during the winter of 1971-72 (without studded tires) are compared with those during the previous winter (with studded tires). Analysis is made both overall and on a regional basis, of the specific road condition reported at the accident site and the condition generally prevailing. In spite of the general upward trend, summer and winter, in highway accidents, the proportion of accidents on icy, snowpacked, snowy, or slushy roads declined following discontinuance of the use of studded tires.

by P. Smith  
Publ: Highway Research Record n477 p16-26 (1973)  
1973 ; 10ref  
Availability: See publication

HS-014 771

### **BRAKES AND SKID RESISTANCE**

Passenger car antilock braking systems are reviewed along with their manner of operation and their effects on vehicle braking performance and stability. Particular emphasis is placed on the influence of antilock brakes on vehicle stability and stopping performance in straight-ahead braking and cornering situations over a broad range of speeds and pavement conditions. Antilock system options and the relative merits of two- and four-wheel systems are discussed, as are their possible future prospects.

by H. R. Clemett; J. W. Moules  
Publ: Highway Research Record n477 p27-33 (1973)  
1973 ; 6refs  
Availability: See publication

HS-014 772

**LIMITED-SLIP DIFFERENTIAL AS A WINTER DRIVING TRACTION AID**

The effects of limited-slip differential as a traction aid are described. Limited-slip differentials direct more of the driving force to the wheel with better tractions, improving the mobility of the vehicle. Limited-slip differentials and studded tires are complementary to one another since the studded tires increase the amount of traction available, and the limited-slip differentials enable vehicles to use more of the traction that is available. The performance of the limited-slip differential is generally independent of the driver. It does its job automatically so that no special action is required except reasonable care not to abuse it.

by F. W. Petring

Publ: Highway Research Record n477 p34-7 (1973)

1973 ; 2refs

Availability: See publication

HS-014 773

**SAFER WINTER TIRES USING OIL-EXTENDED NATURAL RUBBER**

The grip of oil-extended natural rubber winter tires made of both cross-ply and radial-ply constructions was assessed during three separate trials in Scandinavia. The tests were carried out on ice and hard-packed snow at temperatures as low as -15 C. The variability of ice makes it difficult to obtain reliable data unless a large number of measurements are made on several different occasions. The results presented show that oil-extended natural rubber has better grip than conventional high hysteresis synthetic tire treads and may even perform better than studded conventional tires. The use of oil-extended natural rubber winter tire treads would make a significant contribution to road safety under winter conditions.

by E. Southern

Publ: Highway Research Record n477 p41-6 (1973)

1973 ; 6refs

Availability: See publication

HS-014 774

**RETARDERS FOR TRUCKS AND BUSES**

Conference presentations on retarder use in commercial vehicles such as trucks and buses are summarized. Speakers included vehicle operating engineers with practical experience of supplementary braking systems and designers of each main type of commercial vehicle retarder. Main topics covered include: experience with exhaust brakes, the Jacobs engine brake, transmission retarders, and hydrokinetic retarders.

by A. Bunting

Publ: Automotive Design Engineering v13 p12-3, 15 (Feb 1974)

1974

Availability: See publication

HS-014 775

**TRAUMA AS A FUNCTION OF FORCES AND ACCELERATIONS IN COLLISIONS. FINAL REPORT**

All suitable frontal force accident cases in the U. S. involving 1968-71 full-size "B" body General Motors vehicles were reviewed to provide a data bank of accident case data for subsequent comparison with experimental data derived from a vehicle having the same body style. Some 48 cases with 65 occupants were selected. Injury data were classified according to the Barrier Equivalent Velocity (BEV) of accident vehicles based upon vehicle deformation. The experimental program recorded reactions of anthropomorphic dummy occupants under collision conditions simulating actual injury-causing accidents. Injury criteria obtained were compared and the results provided an injury measure as a function of BEV and injury indices (Head Injury Criterion, the Gadd Chest Severity Index, and Chest Injury Criterion of 60 g max/with a 3-millisecond exclusion). Equations were derived relating injury with BEV and injury criteria. The paucity of data precludes a high confidence level statistical analysis but provides a basis for comparing injury with accident velocity and injury.

by L. M. Patrick

Wayne State Univ., Detroit, Mich. Coll. of Engineering

Contract MVMA(AMA)-WSU-7101-C19

Rept. No. MVMA-WSU-74-04 ; 1974 ; 115p

Sponsored by the Motor Vehicle Manufacturers Assoc. of the United States, Inc., Detroit.

Availability: NTIS

HS-014 776

**UTAH TRAFFIC ACCIDENTS AND ACCIDENT RATES 1973**

Data on motor vehicle accidents and accident rates on Federal-aid and state highways in Utah are presented in tabular form. Routes are listed with individual sections identified by milepost limits. The accident rate is derived from a relationship between total number of accidents, length of highway section, average daily traffic, and time period in days.

Utah State Dept. of Highways.

1974 ; 93p

Prepared in cooperation with the Federal Hwy. Administration.

Availability: Corporate author

HS-014 777

**PROCEDURES MANUAL FOR ROADSIDE HAZARD INVENTORY AND SAFETY IMPROVEMENT ALTERNATIVES. INTERIM REPORT**

The National Cooperative Highway Research Program (NCHRP) Project 20-7, Task Order 1 proposed a probabilistic model as a management tool in establishing the priority for roadside safety improvements. The phase of research to develop a formalized implementation procedure compatible with Texas Highway Department policy, to program roadside safety improvements on controlled access highways, is described. The large number of hazards to be inventoried and the feasible safety improvement alternatives necessitate use



located within the 30-ft recovery zone, are described, including a discussion of the data input/output format. Examples of safety improvement alternatives for selected hazards are presented.

by G. D. Weaver; E. R. Post; D. L. Woods  
Texas A and M Univ., College Station. Texas Transp. Inst.  
Grant RS-2-8-72-11  
Rept. No. RR-11-1; TTI-2-8-72-11-1 ; 1974 ; 119p 4refs  
Sponsored by the Texas Hwy. Dept. in cooperation with the  
Federal Hwy. Administration. Rept. for Sep 1972- Aug 1973.  
Research study title: "Cost-Effectiveness Priority Program for  
Roadside Safety Improvements on Texas Freeways."  
Availability: Corporate author

HS-014 778

**HIGHWAY ACCIDENT REPORT: WILMETH  
CATTLE COMPANY  
TRUCK/BRIDGE/TRANSPORTATION ENTERPRISES,  
INC., BUS, U. S. 60-84, FORT SUMNER, NEW  
MEXICO, DECEMBER 26, 1972**

A crash involving 19 fatalities, 15 injuries in a cattle truck (tractor-semitrailer and a school bus-type vehicle at a narrow bridge site in New Mexico is described and analyzed. It was determined that the probable cause of the initial collision (truck/bridge end-post) was the failure of the truck driver to keep his vehicle in the proper lane of travel. Factors that contributed to that condition were: the influence on the truck driver of two oncoming vehicles; the absence and deceptive placement of light-reflecting traffic control devices; the absence of a solid centerline on the bridge and its approaches; the narrow width of the bridge deck; and the truck driver's concern that braking would cause his vehicle to jackknife. Federal recommendations are included.

National Transp. Safety Board, Washington, D. C.  
Rept. No. NTSB-HAR-74-1; SS-H-26 ; 1974 ; 46p 4refs  
Report contains Highway Safety Recommendations H-74-4  
through THROUGH H-74-11.  
Availability: NTIS

HS-014 779

**CITY OF INGLEWOOD. TRAFFIC RECORDS  
SYSTEM PROCEDURES MANUAL**

A traffic records system procedures manual for the City of Inglewood, Calif., is presented which focuses on several major areas: system output reports; system data base; input and correction procedures; and description and use of edit/audit reports.

Optner (Stanford L.) and Associates, Inc., Los Angeles, Calif.  
1973 ; 155p  
Availability: Reference copy only

HS-014 780

**INTOXICATION AND INNOCENCE IN A CITY'S  
FATAL TRAFFIC ACCIDENTS**

Fatal traffic accidents in one city were examined to determine how many of all the drivers involved were intoxicated and how many of all the people killed, including drivers, occupants, and pedestrians, were the innocent victims of drunken

drivers. The age, sex, and race of the drivers, the degree of injury sustained by each person, the time at which each accident occurred, and the contributing circumstances for the accidents were also determined. Results showed that about 26% of the fatal accidents involved drunken drivers, that late Friday and Saturday nights were the worst times, that 33% of the known drunk drivers were under 25 years old, and that an estimated 8% of the city's traffic fatalities were the innocent victims of intoxicated drivers.

by W. A. Sieck  
Bliss (Malcolm) Mental Health Center, St. Louis, Mo.  
1973? ; 28p 3refs  
Availability: Corporate author

HS-014 781

**THE DRUNKEN DRIVER: INSTITUTIONAL  
RESPONSES AND A COMMUNITY ALTERNATIVE**

The scope of the drunken driver problem is statistically analyzed and both institutional responses and community alternatives are examined. The two major institutional approaches include the mental health system as it treats the alcoholic, and the judicial-penal system as it supplies punishment as a deterrent. The ineffectiveness of these methods at getting to the heart of the problem is discussed. A community response alternative is proposed which uses taxicab driver services to drive the drunk driver and his family home in his own car for free, with the cost paid for by increased fines levied against those who refused to use the voluntary service and were arrested for drunk driving.

by W. A. Sieck  
Bliss (Malcolm) Mental Health Center, St. Louis, Mo.  
1973 ; 24p 9refs  
Prepared for presentation at the Missouri Div. of Mental Health and the Missouri Div. of Hwy. Safety workshop, "The Drunken Driver: A Community Concern," Jefferson City, Mo., 12 Apr 1973.  
Availability: Corporate author

HS-014 782

**A STUDY OF EMISSIONS FROM 1966-1972 LIGHT-  
DUTY VEHICLES IN WASHINGTON, D. C.**

As part of the 1972 Emission Factors Program (Six Cities Program), 170 privately-owned passenger vehicles from the Metropolitan Washington, D. C. area were tested for exhaust emission levels of carbon monoxide, carbon dioxide, hydrocarbons, and oxides of nitrogen according to the 1975 Federal Test Procedure. Testing of vehicles included both cold and hot start cycles. The test results were used to calculate emission factors based on both the 1972 and 1975 Federal Test Procedures.

by A. R. Martin; R. A. Herrick  
General Environments Corp., Springfield, Va.  
Contract EPA-68-01-0454  
Rept. No. APTD-1506; PB-224 242 ; 1973 ; 108p  
Availability: NTIS

HS-014 783

## **MARIHUANA AND HEALTH. THIRD ANNUAL REPORT TO CONGRESS FROM THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE**

Health implications of marijuana use for Americans are examined from a variety of standpoints, including: toxicity and neurophysiological and endocrinological research in animals; use in other countries; behavioral effects in animals; pharmacological research in animals; effects in man (physical toxicity, chronic physical effects, genetic and birth defects, and psychiatric illness); extent, patterns, and social context of use in the United States; further effects in man (the active ingredient, route of administration, metabolism, subjective, physiological and biochemical aspects, intellectual and psychomotor effects). The complexity of the subject is stressed.

National Inst. on Drug Abuse, Rockville, Md.  
Rept. No. DHEW-Pub-(ADM)-74-50 ; 1974 ; 170p refs  
Prepared for the Dept. of Health, Education, and Welfare in cooperation with the National Inst. of Mental Health.  
Availability: GPO \$1.85

HS-014 784

## **TRAFFIC ON UTAH HIGHWAYS 1973**

The average daily traffic volumes on road sections of varying lengths on the interstate, primary, Federal-aid secondary, and state highways of Utah are presented. The tabular data were collected and compiled by a state Traffic Analysis Unit and are based upon a variety of counting stations. Machines were utilized on all highway systems and manual classification counts were made seasonally, four times during the year. For comparative purposes, previous average daily traffic volumes are shown for several years back to 1937.

Utah State Dept. of Highways, Salt Lake City. Systems Planning Div.  
1974 ; 229p  
Prepared in cooperation with the Federal Hwy. Administration  
Availability: Corporate author \$5.00

HS-014 785

## **TRAFFIC RECORDS NEEDS STUDY. FINAL REPORT**

The need for a regional approach to traffic records systems and the recommendation of a specific approach are presented in a study which identifies the potential benefits of such a system. The needs for traffic information of traffic engineers and traffic enforcement supervisors in 10 cities are determined. A principal recommendation is that a regional traffic records systems should be implemented in Orange County, Calif., Orange County Accident Records System (OCARES), which would adapt the computer software and administrative practices employed in other counties. A plan for implementation in two phases is included. The implementation plan is expressed in a model application for a traffic safety grant and a request for proposals from vendors for systems support.

Pharos Systems, Irvine, Calif.; Crommelin (Robert) and Associates, Inc., Encino, Calif.  
Contract 107305  
1973 ; 114p 13refs  
Sponsored by the City of Tustin, Calif., Office of Traf. Safety, State of Calif., and the National Hwy. Traf. Safety

Administration. Prepared for the Users Committee on behalf of the Public Agencies Data Systems.  
Availability: Corporate authors

HS-014 786

## **CITY OF NEWPORT BEACH TRAFFIC SAFETY PROJECT ""TRIP"". FINAL REPORT**

Project TRIP (Traffic Records Implementation Project), whose objective was to incorporate and implement an existing traffic records system to collect, evaluate, publish, and disseminate all information relative to traffic conditions in the city, is described. It also provides an automated traffic records system that is easy to utilize and maintain and generates timely information for accident and citation analysis, producing timely, regular reports for the traffic engineer and law enforcement agencies. Methodology and problems in implementation are discussed along with the extent of its success.

by R. R. Sanders; R. S. Hamilton  
City of Newport Beach, Calif.  
1973 ; 118p  
Rept. for 1 Jul 1972-30 Jun 1973. Sponsored by the Office of Traf. Safety, State of Calif. and the National Hwy. Traf. Safety Administration.  
Availability: Newport Beach Polic Dept., Newport Beach, Calif.

HS-014 787

## **TRAFFIC CONTROL DEVICE INVENTORY SYSTEM. FINAL REPORT**

Development of an automated Traffic Control Device Inventory (TCDI) system to service multiple cities in the Pomona Valley area is described. The computer system is capable of identifying all objects located within the street right of way that have a direct or indirect bearing on capacity, traffic flow, and/or traffic safety. The development approach is discussed and benefits outlined. General consideration is given to design criteria, field survey, and system input documents and output reports.

Pomona Management Systems Dept., Calif.  
1974 ; 65p  
Sponsored by the Office of Traf. Safety, State of Calif. and the National Hwy. Traf. Safety Administration.  
Availability: Corporate author

HS-014 788

## **TRAFFIC RECORDS SYSTEM**

The Long Beach Traffic Records System is described which aims at providing a modern, electronic data processing system to reduce traffic accidents through the determination and implementation of enforcement, engineering, and education corrective measures with the use of adequate accident record information. The output of the system was to be designed to provide exception reporting, accident rate reporting, plots of street network or portions of network accident rates, accident trends and predictions, reports on effectiveness of improvement, analytical and guides-to-decision reports, reports which

aggregate and classify data, and summary reports. Methods and output are reviewed.

City of Long Beach, Calif.

1973 ; 153p

Sponsored by the Office of Traf. Safety, State of Calif., and the National Hwy. Traf. Safety Administration.

Availability: City of Long Beach, 205 West Broadway, Long Beach, Calif. 90802

HS-014 789

## **TRAFFIC RECORDS SYSTEM PHASE 2. FINAL REPORT**

The revision of the Los Angeles Traffic Records System is described, including updating traffic sign and roadway characteristics files, extending the records retrieval program capability, and developing a computer program for auditing the consistency of related data elements in the files. The data cover traffic signals, traffic signs, roadway characteristics, street lights, and operating speeds. A number of special data retrievals have been made with the objective of identifying road or traffic sign conditions which can be corrected, thus reducing accident potential.

by S. E. Rowe; L. P. Nepsund; S. S. Taylor

Los Angeles Dept. of Traffic, Calif.

Grant IS-69-016(001)

1973 ; 183p

Sponsored by the Office of Traf. Safety, State of Calif. and the National Hwy. Traf. Safety Administration

Availability: Corporate author

HS-014 790

## **SYSTEM TO ADMINISTER AND CONTROL THE PROCESSING OF NON-PARKING TRAFFIC CITATIONS AND DIRECT FILINGS. FINAL REPORT. FRESNO COUNTY.**

A system to administer and control non-parking traffic citations and direct filings is reviewed, including its overall operation, detailed specifications of the computerized portion of the system, a project evaluation, and recommendations for further action. Benefits of the system include: identification of defendants who repeatedly violate traffic laws, improved judicial information in the form of statewide driver history records, improved bail setting procedures which set financial penalties on a graduated basis, more timely and efficient clerical procedures, and increased revenues attributable to the graduated bail schedule and increased fines ordered by the court.

Young (Arthur) and Co., Washington, D. C.

1973 ; 77p

Availability: Clerk of the Court, Fresno Municipal Court, Fresno, Calif. 93712

HS-014 791

## **CITY OF NATIONAL CITY. TRAFFIC ACCIDENT INFORMATION SYSTEM. FINAL REPORT**

The National City, Calif., Integrated Traffic Records System is described and analyzed. The system provides assistance in allocating manpower at times and locations where traffic problems are the greatest; demonstrates those vehicle code

and municipal code violations that are identified as causative factors in collisions; and develops data bases and automated engineering records in forms which facilitate management analysis and decision making in traffic engineering problems. General consideration is given to methodology, end product and benefits, utility to other jurisdictions, and program evaluation and cost.

Optner (Stanford L.) and Associates, Inc., Los Angeles, Calif. 1973 ; 131p

Availability: City Engineer, City of National City, 1243 National Avenue, National City, Calif. 92050

HS-014 792

## **ALAMEDA COUNTYWIDE TRAFFIC RECORDS SYSTEM (ACTRS) USERS MANUAL**

The Alameda Countywide Traffic Records System (ACTRS) is described, which is designed to serve the traffic safety records needs for local agency enforcement and engineering personnel. It is a highly integrated computerized system which brings together data on accidents, traffic volume, and the street network, and will produce a total of 24 reports on a regular basis. The system provides generalized retrieval capabilities for responding to user questions as they arise with experience. The Users Manual serves as the basic reference with respect to the types of reports available, contents of these reports, and request procedures. Sections are included on computer files, summary of computer-produced reports, use of computer-produced reports, a detailed description of each report produced by ACTRS, and directions for preparation of requests.

by J. L. Schlaefli; D. W. Cook; V. M. Gallagher; S. H.

Hutchins; K. R. Marcum; S. E. Rowe

Stanford Research Inst., Menlo Park, Calif.

Rept. No. SR-TN-8513-1 ; 1971 ; 262p

Prepared for the City of Oakland, Calif., Traf. Engineering and Parking Dept.

Availability: City of Oakland, Traf. Engineering and Parking Department, Oakland, Calif.

HS-014 793

## **VARIATIONS IN TIRE HYSTERETIC LOSSES DUE TO TIRE DESIGN**

A previously-derived method for analyzing the energy losses of tires that have reached a state of thermal equilibrium is extended by clarifying the various mechanisms of energy losses resulting from variation in viscoelastic properties of the tire materials, in tire design, and in operating conditions. The phenomenon of the energy losses due to the condition of strain in the tread region is examined in detail. The study of the energy losses enables the losses due to the various stress-strain deformations to be characterized. The losses are correlated with two mechanisms, which are outlined. The results described enable a better understanding of the mechanisms responsible for tire energy losses and allow the tire losses to be predicted at the design stage.

by P. R. Willett

Publ: Rubber Chemistry and Technology v47 n1 p118-26 (Mar 1974)

1974 ; 10refs

Part of post graduate research thesis, New South Wales Univ., Australia.

Availability: See publication

## **MOBILITY OF EXTENDER OIL IN TIRES UNDER SERVICE CONDITIONS. 1.**

The extent of oil diffusion in tires during service is correlated with the resulting effects of oil migration on the compound properties as they relate to tire performance. It is found that: most oil diffusion from tread to carcass takes place during the tire curing process; oil migration occurs at a faster rate and to a greater extent in dynamometer than in track tests; migration is a continuous process, not a step function; decrease in tire strip adhesion correlates with extent of oil migration into carcass stock; infusion of oil into carcass skimcoats decreases fracture and strength properties of stocks; and an apparent decrease in the general stock strength properties of the whole tire occurs as a result of the oil migration process.

by M. L. Deviney; L. E. Whittington; C. W. Good; R. J. Sperley  
 Publ: Rubber Chemistry and Technology v47 n1 p127-49 (Mar 1974)  
 1974 ; 9refs  
 Presented at The Rubber Division, American Chemical Society, Denver, 9-12 Oct 1973.  
 Availability: See publication

HS-014 795

## **ANALYTICAL METHOD FOR MEASURING SBR TIRE DEBRIS IN THE ENVIRONMENT**

A procedure is developed for assaying submilligram amounts of debris from synthetic tire tread rubber in aerosol samples collected from the atmosphere. The procedure involves separation from the bulk of the sample by Soxhlet extraction with orthodichlorobenzene in a stream of oxygen, followed by infrared spectroscopic determination of the rubber hydrocarbon SBR (styrene-butadiene copolymer) in the extract. The procedure was developed to overcome difficulties having to do with the small amounts of rubber normally encountered and with losses of SBR during extraction from aerosol samples. These matters are discussed in detail and some applications of the method are illustrated.

by W. Bracheczek; W. R. Pierson  
 Publ: Rubber Chemistry and Technology v47 n1 p150-60 (Mar 1974)  
 1974 ; 7refs  
 Availability: See publication

HS-014 796

## **DEPENDENCE OF LABORATORY TIRE CORD ADHESION ON RUBBER PROPERTIES**

Compound ingredients varied to obtain changes in rubber properties are examined, including the proportion of natural rubber to SBR (styrene-butadiene rubber), carbon black loading, amounts and ratios of sulfur and accelerator, oil-to-black ratios, and the addition of silica. The adhesion of both glass and nylon tire cords to these compounds was evaluated. Adhesion data for all compounds are correlated with the physical properties of the rubbers by means of a regression treatment using an IBM 1130 computer. H- and strip adhesion results on nylon and glass tire cords were found to depend on various physical properties of the adhering rubber compounds. The strip adhesion test was most affected by changes in tensile

strength and elongation, with higher values of adhesion being measured with high elongation-high strength compounds. Tensile strength was especially influential in the case of hot strip adhesion.

by D. E. Erickson  
 Publ: Rubber Chemistry and Technology v47 n1 p213-30 (Mar 1974)  
 1974 ; 26refs  
 Presented at The Rubber Division, American Chemical Society, Denver, 9-12 Oct 1973.  
 Availability: See publication

HS-014 797

## **MARYLAND AUTOMATED ACCIDENT REPORTING SYSTEM. FINAL REPORT**

The Maryland Automated Accident Reporting System (MAARS) is described. The goal was the development of a new range of motor vehicle accident data adequate for the needs of existing state and local programs and service, and a system for recording and retrieving this data in summary fashion. Sections of the reports provide: a capsulized summation of the activities which led to the definition of the final MAARS; a discussion of the items on an individual basis; and the final MAARS system. The capabilities of the final system are identified and illustrated through a separate section that contains a limited sampling of the computer-generated outputs.

Safety Management Inst., Washington, D. C.  
 1973 ; 128p  
 Prepared for the Dept. of Public Safety and Correctional Services, State of Maryland.  
 Availability: Director of the Data Center, Dept. of Public Safety and Correctional Services, State of Maryland, Annapolis, Md.

HS-014 798

## **COMPUTER SYSTEM TO FACILITATE THE ADMINISTRATIVE ADJUDICATION OF TRAFFIC VIOLATIONS**

A computer system is described which analyzes previous driving records in conjunction with specific traffic infractions, resulting in various computer-generated outputs which enable the adjudication process to be combined with a driver control program. The system prepares output such as court dockets and cash reports, and forces a defendant in jeopardy of losing his driving privileges to appear before a hearing referee. The concepts upon which the system is based are shown.

New York State Dept. of Motor Vehicles, Albany  
 1970 ; 253p  
 Availability: State of New York, Dept. of Motor Vehicles, 130 Ontario St., Albany, N.Y. 12206

HS-014 799

## **PREDICTING THE TREAD WEAR OF NONDRIVEN FRONT AXLE TIRES FROM LABORATORY measurements**

A method is derived and confirmed for predicting the tread wear configurations of tires positioned on nondriven axles of passenger vehicles. The method is based on laboratory mea-

measurements of the interfacial stresses of freely rolling tires and takes account of perturbations in these stresses that occur during the road test procedure. Wear is found to occur primarily at the exit end of the tire-road interface, and the degree of wear is related to the interfacial pressure and slip determining conditions at that location. The steering properties of the tire also enter into the determination. Abrasion resistance of the rubber, temperature, character of the road surface, the test course, and the procedure all appear in the equations of wear in aggregate as a coefficient. Interference effects between adjacent ribs of the tire are also noted.

by K. L. Oblizajek; S. A. Lippmann  
Uniroyal, Inc., New York  
Rept. No. SAE-740073 ; 1974 ; 9p 11refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-014 800

### **THE DISTRIBUTIONS OF STRESS BETWEEN THE TREAD AND THE ROAD FOR FREELY ROLLING TIRES**

The nature of the measuring equipment used in the investigation of tire-road interactions is outlined, and the results of a study of the interfacial stress distributions of a radial-ply, a bias-belted, and a bias-angle tire are presented. Tractive ratios and effective coefficients of friction are discussed, and tractive ratio distributions are displayed for all of the conditions treated and for the three types of tires. The study also covers the changes in stress distributions that result from steering and the relation of these alterations to the lateral thrust and self-aligning torque of the tires.

by S. A. Lippmann; K. L. Oblizajek  
Uniroyal, Inc., New York  
Rept. No. SAE-740072 ; 1974 ; 32p 19refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-014 801

### **CLARK COUNTY TRAFFIC RECORDS**

Accident experience on the Clark County, Washington, road system is identified and a data basis is established by location. The high accident locations are arrayed by total accident frequency and by hazard index, as well as by accident rate. A critical accident rate analysis method was developed to eliminate locations which might have an exceptionally high accident rate simply due to chance. The analysis procedure is based on an accident collision summary, accident statistics, and an on-site review. Some 24 high accident locations are identified and studied, with specific recommendations for accident reduction measures given for each location. Recommendations include installation of various devices (flashers, left-turn hold lanes, stop signs, pavement markings) intersection widening, hedge trimming, and reconstruction.

Futrell, Inc., Vancouver, Wash.  
1972 ; 72p 2refs  
Sponsored by the Washington Traf. Safety Commission and the National Hwy. Traf. Safety Administration.  
Availability: Clark County, 1200 Franklin Street, Vancouver, Wash. 98660

HS-014 802

### **ANAHEIM COMPUTERIZED TRAFFIC RECORDS SYSTEM. FINAL REPORT**

The Anaheim, Calif., Computerized Traffic Records System (CTRS) project is reviewed, including project results, methodology, and significant problems encountered. The CTRS project developed a data base of traffic records and implemented a capability to utilize them for the analysis and evaluation of traffic problems. The data bases consists of traffic inventory of traffic control devices, and street and highway traffic flow data. The analytical capabilities for utilizing the data base are directed toward improvement in operation procedures, traffic control information, street and highway engineering, identification and surveillance of accident locations, and accident reduction.

Anaheim Police Dept., Calif.  
1973 ; 75p  
Sponsored by the Office of Traf. Safety, State of Calif. and the National Hwy. Traf. Safety Administration.  
Availability: Corporate author

HS-014 803

### **PHOTOMETRIC TESTS OF VEHICLE GLAZING MATERIALS**

Measurements were made on the transmittance of vehicle glazing materials in the laboratory on representative samples and in the vehicles. General operation requirements and performance criteria included the design and performance of both the light source and photometer. The glazing materials were mounted on a goniometer for the laboratory tests, and transmittance was measured as the sample was rotated about its horizontal axis. In-vehicle transmittance measurements were made of the windshield, side windows, and back windows on four different vehicles. Recommended equipment and procedures for transmittance measurements of in-vehicle glazing materials are given.

by W. A. Hall; E. L. Walters; I. Nimeroff; C. A. Douglas  
National Bureau of Standards, Gaithersburg, Md.  
Contract DOT-HS-020-2-3121A  
Rept. No. NBS-10 902 ; 1972 ; 29p  
Availability: Corporate author

HS-014 804

### **THE ROLE OF VISION AND AUDITION IN TRUCK AND BUS DRIVING. FINAL REPORT**

The visual and auditory requirements of commercial carrier driving were studied, based on a review of the literature, a detailed examination of the driving task, and observations of an interviews with drivers. New visual performance measures dealing with perception of motion and dynamic performance measures dealing with perception of motion and dynamic performance of the total visual system were identified as important to driving. A device was designed and constructed that provided the capability of testing performance on these new visual performance parameters as well as on selected conventional methods. Performance on vision tests and on a standard audiometric test of hearing loss was measured on 236 commercial drivers and compared with past accident records. The results show that poor performance on several of the new vision tests is associated with poor driving record. No similar

results were obtained for auditory measures. It is concluded that new visual qualification standards for commercial carrier drivers might be justified.

by R. L. Henderson; A. Burg  
Sytem Development Corp., Santa Monica, Calif.  
Contract FH-11-7923  
Rept. No. TM(L)-5260/000/00 ; 1973 ; 181p 28refs  
Availability: Federal Hwy. Administration, Washington, D.C.

HS-014 805

## **CHILD RESTRAINT SYSTEMS. FRONTAL IMPACT PERFORMACE**

State of the art design concepts, medical knowledge, regulations, and impact performance of different child restraint systems in Sweden are defined, and compliance test procedures and performance criteria are recommended. Some 34 frontal impact tests were made with 25 systems. Impact speed was 30 mph and the deceleration level 15-20 g. Fully instrumented Alderson 3 and 6-year-old anthropomorphic dummies were used, and the measurements included dummy and sled accelerations, forces and displacements. It is shown that the rearward facing systems have a considerably better protection performance than forward facing systems, lap belts, shields, cushions, harnesses, and hookover seats, especially concerning head acceleration and displacement. It is proposed that the head accelerations be used as the main performance criteria. General recommendations for protection and handling improvements of rearward facing seats are included.

by T. Turbell  
Statens Vag- Och Trafikinstitut, Stockholm (Sweden)  
Rept. No. R-36A ; 1974 ; 124p 18refs  
Sponsored by the Transport Res. Delegation. One of a series of investigations to promote safer transportation of children. See also HS-014 806, HS-014 807.  
Availability: Corporate author

HS-014 806

## **CHILD RESTRAINT SYSTEMS. HANDLING PERFORMANCE OF BUCKLES AND HARNESSSES ON CHILD SEATS**

Two psychological and technical studies of child car seats are reported, the first dealing with two-to-five year-old children's potentially dangerous capacity for opening different buckles, and the second dealing with adults' difficulties in removing children from different types of child seats under simulated conditions of darkness. In the first experiment all but one of the children over four years of age opened all the buckles; half were opened by one or more of the youngest children. One of the buckles classified as technically difficult and strenuous could not be opened by any child under four. In the experiment with adults, opening times differed greatly, and it took more than two minutes before one or more of the subjects had rescued the child-dummy from five of the 10 seats. It is concluded that proposals altering the design of child seats are needed.

by P. W. Arnberg  
Statens Vag- Och Trafikinstitut, Stockholm (Sweden)  
Rept. No. R-37A ; 1974 ; 65p 15refs  
Sponsored by the Transport Res. Delegation. One of a series of investigations to promote safer transportation of children. See also HS-014 805 and HS-014 807.  
Availability: Corporate author

HS-014 807

## **CHILD RESTRAINT SYSTEMS. PSYCHOLOGICAL PROBLEMS RELATED TO THE USE OF REARWARD FACING CHILD SEATS**

Psychological problems related to the use of child car seats are examined in three studies: a general questionnaire survey of the use of car seats; interviews with 60 parents to assess the differences between rearward-facing seats, forward-facing seats, and having children unrestrained in cars; and a study of the effect of rearward-facing seats on the attitudes of 16 parents who had not used these seats before. Results show that problems (e.g., car sickness) using rearward-facing seats were not greater than those experienced when using forward-facing seats or none at all. This preference and proven safety factors in collision impact tests encourage the use of rearward-facing child seats.

by P. W. Arnberg  
Statens Vag- Och Trafikinstitut, Stockholm (Sweden)  
Rept. No. R-38A ; 1974 ; 30p 17refs  
Sponsored by the Transport Res. Delegation. One of a series of investigations to promote safer transportation of children. See also HS-014 805, and HS-014 806.  
Availability: Corporate author

HS-014 808

## **THE INJURY SEVERITY SCORE: A METHOD FOR DESCRIBING PATIENTS WITH MULTIPLE INJURIES AND EVALUATING EMERGENCY CARE**

A method for comparing death rates of groups of injured persons was developed, using hospital and medical examiner data for more than 2000 persons. Injury severity as rated by the Abbreviated Injury Scale was correlated with patient survival. Controlling for severity of the primary injury made it possible to measure the effect on mortality of additional injuries. An Injury Severity Score was developed that correlates well with survival and provides a numerical description of the overall severity of injury for patients with multiple trauma. Results indicate that the Injury Severity Score represents an important step in solving the problem of summarizing injury severity. The score is easily derived and facilitates comparison of the mortality experience of varied groups of trauma patients, improving ability to evaluate care of the injured.

by S. P. Baker; B. O'Neill; W. Haddon, Jr.; W. B. Long  
Publ: Journal of Trauma v14 n3 p187-96 (Mar 1974)  
1974 ; 13refs  
Supported by the Insurance Inst. for Hwy. Safety and the Maryland Medical-Legal Foundation.  
Availability: See publication

HS-014 809

## **THE LEGAL MINIMUM DRINKING AGE AND FATAL MOTOR VEHICLE CRASHES**

Comparison of three areas that lowered the legal minimum drinking age from 21 to 18 with adjacent areas that did not change the law indicates that there was a significant increase in involvement in fatal crashes of drivers under 21 in areas that changed the law, particularly in nighttime and single vehicle crashes where alcohol is most often involved. This also occurred to a lesser degree among 15-17 year-olds as well. The fatal crash involvement of drivers under 21 in border areas of

change and nonchange states was not significantly greater than involvement in interior areas of the states studied.

by A. F. Williams; R. F. Rich; P. L. Zador; L. S. Robertson  
Insurance Inst. for Hwy. Safety, Washington, D. C.; Chicago Univ., Ill.  
1973? ; 35p 37refs  
Availability: Corporate authors

HS-014 810

## **PEDALING ALONG**

The use and popularity of bicycling as a means of commuting is discussed along with various aspects to consider in purchasing a bicycle. Middleweight, lightweight, and derailleur bikes are compared, and consumer needs are described, including cost considerations. Rider fit, tire types, brake and pedal design, and seat comfort are discussed. Suggestions are offered for where to buy both new and used bikes. Further attention is drawn to safety factors, handling performance, pedaling in traffic, maintenance, and theft prevention.

Publ: Driver v7 n12 p1-7 (May 1974)  
1974  
Availability: See publication

HS-014 811

## **STATEMENT OF WILLIAM HADDON, JR., M.D., PRESIDENT, INSURANCE INSTITUTE FOR HIGHWAY SAFETY BEFORE THE HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE SUBCOMMITTEE ON COMMERCE AND FINANCE, JANUARY 28, 1974, RE: LOW-SPEED CRASH TESTS**

Results of a low-speed crash test series for 1974-model automobiles of domestic manufacture are presented. It is noted that progress by manufacturers in designing the front and rear ends of domestic cars to be less fragile has been greatly slowed, stopped, or even reversed in some cases. The results show great variation in susceptibility to damage from model to model, as indicated by variances in repair bills. The improvements introduced in the 1973 models generally have been negated by the design and manufacturing choices of the 1974 models. For seven representative domestic sedan and small-car models, the average, designed-in damage cost for the 1974 versions at front-into-barrier impact speeds of 5 mph was nearly triple the average cost for the 1973 models.

Insurance Inst. for Highway Safety, Washington, D. C.  
1974 ; 65p refs  
Availability: Corporate author

HS-014 812

## **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT. OVERVIEW**

This paper includes statements of tentative assumptions as to present and future capacity to deal with the variety of environmental impacts of the automobile and provides accounts of existing legal mechanisms to deal with the environmental impact of the automobile and their relation to existing technology. It articulates selected problems and contains an introductory

description of proposed methodologies for the generation of data required to analyze the accuracy and cost effectiveness of existing and proposed policies. Sections include: the automobile as a source of pollution; federal emissions regulations; automobile noise; solid waste disposal; automobiles in the urban environment; transportation models; land use; urban transportation; etc.

by F. P. Grad; A. J. Rosenthal; J. A. Fay; J. F. Kain  
Columbia Univ., New York; Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering; Harvard Univ., Cambridge, Mass.  
GrantNSF-GI-29965  
Rept. No. Working Paper-1 ; 1972 ; 101p 100refs  
Prepared for presentation at a Project Conference, 18-19 Apr 1972, by the Legislative Drafting Res. Funds, Columbia Univ., New York. Sponsored by the National Science Foundation.  
Availability: Columbia Univ., New York, N.Y. Legislative Drafting Res. Fund

HS-014 813

## **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT: DYNAMICS OF AUTOMOBILE POPULATION AND USAGE**

A model of the distributions of automobile age and annual mileage for future vehicle populations is proposed on the basis of correlations of historic data for the period 1958 - 1970. The model requires as input data only the annual production of new vehicles. Historic data for total vehicle registrations and annual vehicle sales are duplicated to within a percent or two. Inconsistencies in existing data are accounted for by plausible hypotheses concerning fleet vehicle mileage, duplicate registrations, and scrappage. Life expectancy, mileage expectancy and other characteristic properties of past and future populations can be easily determined. Future population characteristics depend only slightly upon the increase in future annual production, provided there are no drastic changes in this quantity. Average urban vehicle emissions can readily be determined as well.

by J. A. Fay; M. S. Mingledorff  
Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering  
Grant NSF-GI-29965  
Rept. No. Working Paper-2 ; 1972 ; 28p 7refs  
Prepared for presentation at a Project Conference, 18-19 Apr 72, by the Legislative Drafting Res. Fund, Columbia Univ., New York. Sponsored by the National Science Foundation.  
Availability: Columbia Univ., New York, N.Y. Legislative Drafting Res. Fund

HS-014 814

## **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT: A GENERALIZED MODEL OF URBAN POLLUTANT DISTRIBUTION**

A simplified urban dispersion model is proposed for determining the annual mean concentrations of air pollutants. The model accounts for both near and distant sources, and predicts the average background level as a function of city size and population, and mean annual wind speed. The formulation is correlated for eight cities for which CAMP data is available for the period 1962-1968. It is found from this correlation that for cities exceeding about 10 square miles in area, distant

sources contribute more to the annual mean than to local sources. For large cities, the annual mean of any pollutant is proportional to the population and inversely proportional to the square root of the city area.

by J. A. Fay; W. L. Flower  
Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering  
Grant NSF-GI-29965  
Rept. No. Working Paper-3 ; 1972 ; 32p 14refs  
Prepared for presentation at a Project Conference, 18-19 Apr 1972, by the Legislative Drafting Res. Fund, Columbia Univ., New York. Sponsored by the National Science Foundation.  
Availability: Columbia Univ., N.Y. Legislative Drafting Res. Fund

HS-014 815

### **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT: A LAND-USE TRANSPORTATION MODEL FOR PREDICTING MOBILE EMISSIONS**

The land-use transportation model is the first component of the Air Quality Assessment Model, and its function is to forecast both the spatial distributions of emission sources and the level of emissions produced by these sources. These distributions of emission sources and production rates are functions of the trips made by mode, the intensity of vehicle usage, the emission characteristics of the vehicles used, and the characteristics of the transportation network. The pattern and level of trips are in turn determined by the spatial distribution of activities in the metropolitan area. The design of the land-use transportation model used for forecasting emission rates will be based upon the standard approach used for developing transportation forecasts in most major cities. The five major steps of this standard approach are shown.

by G. K. Ingram  
Harvard Univ., Cambridge, Mass.  
Grant NSF-GI-29965  
Rept. No. Working Paper-4 ; 1972 ; 17p 3refs  
Prepared for presentation at a Project Conference, 18-19 Apr 1972, by the Legislative Drafting Res. Fund, Columbia Univ., New York. Sponsored by the National Science Foundation.  
Availability: Columbia Univ., New York, N.Y. Legislative Drafting Res. Fund

HS-014 816

### **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT; SIMULATING THE URBAN AIRSHED**

The state of the art of modeling the relationship between emission sources and the spatial distribution of pollutant concentrations is assessed. Of particular interest are those results and methods which could be used by the model and those factors which would help in the initial stages of model design. Some suggestions about modeling the urban airshed are offered. Consideration is given to the nature of a dynamic airshed, a taxonomy of models, the choice of model outputs, size of the zones, activity of pollutants, simulation of time, and creating the emissions inventory. Major problems are in creating the zonal emissions inventory by combining stationary sources

with the various vehicular sources and the chemical reactivity of several of the pollutants.

by T. H. Tietenberg  
Williams Coll., Williamstown, Mass.  
Grant NSF-GI-29965  
Rept. No. Working Paper-5 ; 1972 ; 23p 6refs  
Prepared for presentation at a Project Conference, 18-19 Apr 1972, by the Legislative Drafting Res. Fund, Columbia Univ., New York. Sponsored by the National Science Foundation.  
Availability: Columbia Univ., New York, N.Y. Legislative Drafting Res. Fund

HS-014 817

### **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT: INCOME DISTRIBUTIONAL CONSEQUENCES OF 1975 AUTOMOBILE EMISSION STANDARDS**

The impact which meeting the 1975 emission control standards will have on the distribution of income is examined in terms of the distribution of the benefits of reduced automobile emissions, and the distribution of the costs of achieving these standards. Attention is drawn to price changes in the new car and used car markets since they are likely to have the greatest effect on the distribution of private income. The conceptual problems involved in allocating the benefits of reductions in emissions to different income groups are discussed, along with a research scheme designed to obtain crude empirical estimates for a single urban area. Much of the discussion deals with the problems of placing a value on air quality improvements. The problems of allocating the cost effects are also discussed, and a corresponding research scheme to empirically distribute the costs to income groups is proposed.

by D. Harrison  
Harvard Univ., Cambridge, Mass.  
Grant NSF-GI-29965  
Rept. No. Working Paper-6 ; 1972 ; 23p  
Prepared for presentation at a Project Conference, 18-19 Apr 1972, by the Legislative Drafting Res. Fund, Columbia Univ., New York. Sponsored by the National Science Foundation.  
Availability: Columbia Univ., New York, N.Y. Legislative Drafting Res. Fund

HS-014 818

### **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT: INEFFICIENT CAPACITY UTILIZATION: AN URBAN TRANSPORTATION PROBLEM**

A strategy is outlined to identify inefficiencies in the use of the existing system of urban transportation capacity utilization and to recommend changes to eliminate them. Focus is on a particular segment of the urban highway network, which includes local streets, avenues, parkways, and other major arterials, as well as the interstate system. The relationship between traffic volume, speed, and distribution to segment capacity is described. Effects of toll roads are also examined, along with commuting modes and patterns.

by G. Fauth  
Harvard Univ., Cambridge, Mass.  
Grant NSF-GI-29965



Univ., New York. Sponsored by the National Science Foundation.  
Availability: Columbia Univ., New York, N.Y. Legislative Drafting Res. Fund

HS-014 819

### **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT: THE CONSTITUTIONALITY OF THE MANDATORY LICENSING PROVISION OF THE 1970 CLEAN AIR AMENDMENTS**

A mandatory licensing provision in the Clean Air Amendments is discussed in terms of its constitutionality. Possible objections which could be raised to the scheme in general are reviewed. The patent and copyright clause of the Constitution is discussed and interpreted as are the provisions of the Fifth and the Fourteenth Amendments.

by J. M. Battaglia  
Columbia Univ., New York.  
Grant NSF-GI-29965  
Rept. No. Working Paper-8 ; 1972 ; 36p 59refs  
Prepared for presentation at a Project Conference, 18-19 Apr 1972, by the Legislative Drafting Res. Fund, Columbia Univ., New York.  
Availability: Columbia Univ., New York, N.Y. Legislative Drafting Res. Fund

HS-014 820

### **THE AUTOMOBILE AND THE REGULATION OF ITS IMPACT ON THE ENVIRONMENT: WARRANTY PROVISIONS OF THE CLEAN AIR AMENDMENTS OF 1970**

Warranty provisions of the Clean Air Amendments of 1970 are discussed and concluded to generate enough problems to throw considerable doubt on their effectiveness in ensuring initial and continued compliance with federal emission standards. The feasibility is suggested of federal or federally mandated sanctions for the operation of vehicles which do not comply with emissions standards, and to require state inspection systems to enforce them. Further research could deal with the extent to which state and federal courts may fashion their own remedies in dealing with controversies arising under the warranty provisions.

by J. M. Battaglia  
Columbia Univ., New York.  
Grant NSF-GI-29965  
Rept. No. Working Paper-9 ; 1972 ; 19p 30refs  
Prepared for presentation at a Project Conference, 18-19 Apr 1972, by the Legislative Drafting Res. Fund, Columbia Univ., New York.  
Availability: Columbia Univ., New York, N.Y. Legislative Drafting Res. Fund

HS-014 821

### **CONSTRUCTION EXPERIENCE ON ALUMINUM EXPERIMENTAL BODY**

The construction of an aluminum body is compared with an identical steel body. The design parameters set forth for the steel body governed the overall approach resulting in a

realistic comparison between aluminum and steel weight of a body-in-white. Specific techniques used in the construction of the aluminum body are discussed, and areas of difference between aluminum and steel of interest to automotive engineers are outlined. Weight comparison of steel versus aluminum body showed a total weight reduction of 38.94%.

by K. F. Glaser; G. E. Johnson  
Reynolds Metals Co., Richmond, Va.  
Rept. No. SAE-740075 ; 1974 ; 10p  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-014 822

### **ADHESIVE BONDING OF ALUMINUM AUTOMOTIVE BODY SHEET**

The different response of various aluminum body sheet alloys to adhesive bonding procedures was studied using a variety of adhesive bonding materials. The bond durability performance was evaluated under a variety of weathering conditions where different surface preparations and surface contamination were present. The results demonstrate that aluminum body sheet alloys can be durably bonded with a variety of adhesive bonding materials such as elastomeric, vinyl plastisol, and structural epoxy formulations.

by J. D. Minford; E. M. Vader  
Aluminum Co. of America, Pittsburgh, Pa.  
Rept. No. SAE-740078 ; 1974 ; 8p 11refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-014 823

### **AUTOMOBILE PANEL SWEEP STIFFNESS ANALYSIS**

An empirical and a theoretical analysis is developed and employed to predict the stiffness of doubly curved surfaces such as those found in exterior automotive body panels. The dependent variable stiffness is a function of the independent panel variables, which are: panel principal radii of curvature, panel chord lengths, panel thickness, and panel boundary conditions. The empirical analysis, based on measurements made on actual automotive panels, substantiates the theoretical analysis based on finite-element computer techniques. The finite-element technique is used to compute the curvatures required for an aluminum panel to maintain the same stiffness as a steel panel.

by D. G. Adams  
Chrysler Corp., Detroit, Mich.  
Rept. No. SAE-740080 ; 1974 ; 13p 2refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

thickness, and panel geometry or stiffness. Dent resistance increases with an increase in yield strength, thickness and panel radii of curvature, but decreases with an increase in modulus of elasticity and stiffness.

by J. A. DiCello; R. A. George

Chrysler Corp., Detroit, Mich.

Rept. No. SAE-740081 ; 1974 ; 10p 9refs

Presented at the Automotive Engineering Congress, Detroit, 25

Feb-1 Mar 1974.

Availability: SAE

HS-014 825

## **ANALYTICAL STUDIES OF THE HEAD INJURY CRITERION (HIC)**

The Head Injury Criterion (HIC) in FMVSS 208 for evaluating the potential head injury requires maximization of a mathematical expression, involving the time-average acceleration, by varying the limits ( $t_1$ ,  $t_2$ ) of the time interval over which the average is calculated. The HIC behavior is described through the analysis of a function of two independent variables  $t_1$  and  $t_2$ . The analysis is carried out for an arbitration acceleration profile  $a(t)$ . It is found that maximization requires that  $a(t_1) = q(t_2)$ . For the unique values of  $t_1$  and  $t_2$  that maximize HIC, the average acceleration between  $t_1$  and  $t_2$  is  $5/3$  times the acceleration at  $t_1$  or  $t_2$ . Illustrative examples are provided by applying this condition to simple pulses. Numerical results are presented in tables and graphs.

by C. C. Chou; G. W. Nyquist

Wayne State Univ., Detroit, Mich. Biomechanics Res. Center;

General Motors Res. Labs., Warren, Mich.

Rept. No. SAE-740082 ; 1974 ; 14p 7refs

Presented at the Automotive Engineering Congress, Detroit, 25

Feb-1 Mar 1974.

Availability: SAE

HS-014 826

## **EVALUATION OF HEAD INJURY CRITERIA**

An impact model of the human head characterized by an elastic spherical shell (skull) containing a low modulus core (brain) is studied using experimentally determined geometric, material, and structural properties. Injury criteria represented by skull fracture, brain cavitation, and brain shear deformation are interpreted and investigated in terms of effective acceleration-time threshold. Contact stresses and durations are identified for head impacts typical in automobile collisions. In

HS-014 827

## **PREDICTION OF HEAT RELEASE IN A QUIESCENT CHAMBER DIESEL ENGINE ALLOWING FOR FUEL/AIR MIXING**

A computer program based on a two-zone model using jet mixing has been developed to synthesize a cylinder pressure diagram and the results compared with data from a quiescent chamber engine over a range of conditions including off-design conditions of nozzle hole number and size and air supply. Allowance for the effect of hole size on atomization of the fuel was made, using published data, and good correlation was then obtained.

by N. D. Whitehouse; B. K. Sareen

Manchester Univ., Lancs. (England). Inst. of Science and

Technology; Saskatchewan Univ., Saskatoon (Canada)

Rept. No. SAE-740084 ; 1974 ; 12p 9refs

Presented at the Automotive Engineering Congress, Detroit, 25

Feb-1 Mar 1974.

Availability: SAE

HS-014 828

## **THE EFFECT OF CHANGES IN DESIGN AND OPERATING CONDITIONS ON HEAT RELEASE IN DIRECT-INJECTION DIESEL ENGINES**

Heat release data have been obtained from a 5 in bore direct injection diesel engine operating over a range of conditions including off-design conditions, such as running at low air-to-fuel ratios, using six-hole injector nozzles in place of the standard three-hole nozzles, and reducing compression ratio and thereby swirl ratio at tdc. It is shown that when operating with adequate utilized air fuel ratios (A/Fs) the experimental heat release data could be correlated with a single zone combustion model and that changing the number of nozzle holes or compression/swirl ratio had little effect on the correlation after the initial period of heat release. At inadequate A/Fs a modification to the model to allow for partial combustion was introduced to improve correlation and enable reasonable heat release prediction. Examples are given of heat release and cycle pressure diagrams computed using these models.

by N. D. Whitehouse; E. Clough; J. B Way

Manchester Univ., Lancs. (England). Inst. of Science and

Technology; Bath Univ., Somerset (England). School of

Engineering

Rept. No. SAE-740085 ; 1974 ; 11p 3refs

Presented at the Automotive Engineering Congress, Detroit, 25

Feb-1 Mar 1974.

Availability: SAE

HS-014 829

# **EXPERIMENTAL INVESTIGATION AND MATHEMATICAL PRESENTATION OF RATE OF HEAT RELEASE IN DIESEL ENGINES DEPENDENT UPON ENGINE OPERATING CONDITIONS**

On a medium-speed diesel engine, experimental investigations were carried out to determine the relationship between the heat release diagram and parameters such as equivalence ratio, charge air pressure and temperature, engine speed, and injection timing. For a mathematical representation of the results, the actual heat release diagrams are replaced by simplified Wiebe heat release diagrams, which have the same beginning and duration of combustion. A simplified Wiebe heat release diagram is characterized by four parameters: the beginning and duration of combustion, the Wiebe parameter  $m$ , and the equivalence ratio. Empirical correlations are established whereby it is possible to predict variations of these parameters with altered operating conditions. If the heat release diagram and the rate of injection are known from a measurement for a particular operating point, it is possible to predict the heat release diagram for any altered operating conditions.

by G. Woschni; F. Anisits  
Technische Univ., Brunswick (West Germany);  
Maschinenfabrik Augsburg-Nurnberg A.G., Augsburg (West Germany)  
Rept. No. SAE-740086 ; 1974 ; 15p 18refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-014 830

# **COMPUTER SIMULATION OF AUTOMOTIVE COOLING SYSTEMS**

Mathematical modeling of conventional automotive type cooling systems is developed for vehicle design and evaluation. Solution methods are based on system air and coolant side interrelationships. The computer program utilizes either experimental, analytically derived, or empirically calculated steady-state performance characteristics for system components. Typical examples of application to design problems and parametric studies are included in the presentation.

by F. G. Tenkel  
General Motors Corp., Detroit, Mich.  
Rept. No. SAE-740087 ; 1974 ; 12p 7refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-014 831

# **A RATIONAL APPROACH TO AUTOMOTIVE RADIATOR SYSTEMS DESIGN**

A method is presented to design the cooling system of an automobile. At first each individual component is characterized separately, and the description is supported by experimental data. Then the interaction of all components is considered by computation. A parameter study is carried out showing the

way to a low cost design. Finally, a criterion is deduced by which different matrix designs can be rated quickly.

by K. D. Emmenthal; W. -H. Hucho  
Volkswagenwerk A. G., Wolfsburg (West Germany)  
Rept. No. SAE-740088 ; 1974 ; 12p 13refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-014 832

# **EXTENSION AND APPLICATION OF OXIDATION AND OXIDE SPALLATION MECHANISMS TO THE SELECTION OF AUTOMOBILE EMISSION CONTROL HARDWARE**

The basic principles of oxidation and oxide spallation are extended in order that the cyclic oxidation behavior of constitutionally complex alloys can be predicted with minimal experimental input. The analytical predictions are applied to many ferritic stainless steels, austenitic stainless steels, and nickel-base alloys, and are found to be in qualitative agreement with experimental results. Based on the extended principles of oxidation and oxide spallation, general guidelines are developed for the selection of cyclic, oxide spallation resistant alloys. These guidelines are used to rank alloys according to their potentials as automobile emission control exhaust materials.

by J. K. Tien; M. K. Malu; J. M. Davidson; N. A. Gjostein  
Columbia Univ., New York Henry Krumb School of Mines;  
Ford Motor Co., Dearborn, Mich.  
Rept. No. SAE-740090 ; 1974 ; 9p 11refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.  
Availability: SAE

HS-014 833

# **AN EVALUATION OF ALLOYS AND COATINGS FOR USE IN AUTOMOBILE THERMAL REACTORS**

Several candidate alloys and coatings were evaluated for use in automobile thermal reactors. Full-size reactors of the candidate materials were analyzed in cyclic engine dynamometer tests with peak temperature of 1900 F (1040 C). Two developmental ferritic iron alloys GE154 and NASA-18T exhibited the best overall performance lasting at least 60% of the life of the test engine. Four of the alloys evaluated warrant consideration for reactor use, including GE1541, Armco 18 SR, NASA-18T, and Inconel 601. None of the commercial coating substrate combinations evaluated warrant consideration for reactor use.

by C. P. Blankenship; R. E. Oldrieve  
Lewis Research Center, NASA, Cleveland, Ohio  
Rept. No. SAE-740091 ; 1974 ; 21p 12refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.  
Availability: SAE

## **CORROSION PERFORMANCE OF AUSTENITIC AND FERRITIC ALLOYS IN AUTOMOBILE EXHAUST TRAIN ENVIRONMENTS**

The performance of several commercial austenitic and ferritic alloys has been evaluated from 1300-2000°F in cyclic air 00% water vapor and a gasoline engine exhaust gas from 1300-20000°F. The engine exhaust environment was found to be the most aggressive. This was attributed to the gas having passed over the specimens at a relatively high velocity (20-30 ft/s). The significance of undescaled and descaled weight losses, metal loss, depth of internal attack, and total depth damage is discussed, along with visual inspection and microstructure. It was concluded that several corrosion parameters must be considered in evaluating an alloy's performance. For the austenitic alloys, a general trend of increasing performance with increasing nickel content was observed. As a class, the austenitic alloys exhibited better behavior than the ferritic alloys, with the exception of 18 SR. This latter alloy was equivalent to alloy 601 in oxidation resistance, but suffered significant edge attack at higher temperature.

by H. T. Michels  
International Nickel Co., Inc., New York  
Rept. No. SAE-740092 ; 1974 ; 17p 5refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.  
Availability: SAE

HS-014 835

## **PERFORMANCE OF HEAT-RESISTANT ALLOYS IN EMISSION-CONTROL SYSTEMS**

An extensive program to screen and evaluate heat- and corrosion-resistant alloys that may have some potential application in emission-control systems anywhere from the exhaust manifold to the tailpipe is described. The various phases of this program, which include tests conducted in air and controlled exhaust atmospheres at temperatures between 1300-2200 degree F are included. Some selected test data and the results of metallographic studies are presented to illustrate how representative alloys react to the various test conditions. The characteristics and functions of the basic emission-control devices are reviewed in light of their effect upon materials requirements.

by A. Roy; F. A. Hagen; J. M. Corwin  
Chrysler Corp., Detroit, Mich.  
Rept. No. SAE-740093 ; 1974 ; 17p  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.  
Availability: SAE

HS-014 836

## **AUTOMATIC BRAKING BY RADAR**

A braking system using doppler-generated signals to reduce stopping distance of a vehicle in danger of collision is described. The safety device acts on the conventional controls of the vehicle, provides backup where the driver's reaction time is not adequate, and rapid deceleration is required to avoid a collision. Actuation of controls to achieve deceleration is accomplished by two vacuum bellows, one mechanically linked to the brake pedal, another linked to throttle and ac-

celerator. Braking action is initiated by the driver. The system discriminates between objects which present danger of collision, and false targets such as traffic in adjacent lanes and signposts.

by J. B. Flannery  
AutoStop Corp., North Billerica, Mass.  
Rept. No. SAE-740094 ; 1974 ; 6p 2refs  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.  
Availability: SAE

HS-014 837

## **AUTOMOTIVE RADAR BRAKE**

An automatic braking system for automotive vehicles is described which employs an onboard radar sensor to measure distance and relative closing velocity to obstacles in the vehicle path. This range and range-rate information is processed to generate a control signal which is a measure of the critical braking level existing in the dynamic environment. The system provides the driver with advance warning of potential collision situations and can subsequently automatically apply vehicle braking if the driver response is judged inadequate. The critical threshold at which automatic braking is activated is selected to be well beyond that of a normal alert driver, allowing him time to exercise his own options. Implementation problems are discussed. All-weather performance, false alarming, system-driver interface considerations and related human factors are also considered.

by W. C. Troll  
Bendix Corp., Southfield, Mich.  
Rept. No. SAE-740095 ; 1974 ; 8p  
Presented at the Automotive Engineering Congress, Detroit, 25 Feb - 1 Mar 1974.  
Availability: SAE

HS-014 838

## **FIRE IN MOTOR VEHICLE ACCIDENTS: AN HSRI SPECIAL REPORT**

An HSRI study of fire in motor vehicle accidents examined four aspects of this subject: the number of such fires that occur annually, the number of fatalities accompanied by such fires, the number of fatalities resulting directly from such fires, and relationships between types of crashes, fuel leakage, fuel-fed fires, and associated fatalities. The study examined previous research studies in this subject area, HSRI-held traffic accident and medical data, and mortality records maintained by various state or national fire protection or public health organizations. The study found that approximately 17,000 fires result from motor vehicle accidents annually, that from 720 to 1,250 fatalities are accompanied by those fires, and that from 450 to 650 of those fire-associated fatalities result directly from the vehicle fires. The study also found that from 180 to 260 annual fatalities resulting from vehicle fires could be eliminated if all vehicles on U.S. roadways were to comply with the standards contained in the newly amended Motor Vehicle Safety Standard No. 301. This could be accom-

plished over approximately a ten-year period of new-model car introductions.

by P. Cooley  
Michigan Univ., Ann Arbor. Hwy. Safety Res. Inst.  
Rept. No. UM-HSRI-SA-74-3 ; 1974 ; 72p 31refs  
Sponsored by the Motor Vehicles Manufacturers Assoc.  
Availability: Corporate author

HS-014 839

## **NORTH AMERICAN SPEED ZONING CRITERIA**

Some criteria regarding speed zoning in North America are outlined, and it is shown that there is no unanimous agreement on the criteria used. It is generally accepted that the speed limit should be set on the basis of the speed travelled by the majority of the traffic, physical features of the road, roadside development, and accident experience. Few criteria treat these factors in anything more than a subjective manner. Further research in the field is advocated, and a formula or guidelines for quantifying the effect of the various groups of factors which are usually offered for consideration is suggested.

by A. D. Fiander  
Publ: Traffic Engineering and Control v15 n12/13 p560-2 (Apr-May 1974)  
1974 ; 8refs  
Availability: See publication

HS-014 840

## **A COMPUTER PROGRAM FOR PROJECTIONS OF VEHICULAR POLLUTANT EMISSIONS IN URBAN AREAS**

An algorithm for the determination of current and projected annual air pollutant emissions from vehicles in any urban area is described. A computer program based on this algorithm, PAVE, has been developed. A typical running time for this program on modern computers is less than one minute and the cost only a few dollars. The results of applying the program to emissions from automobiles in the San Francisco Bay Area are presented and discussed.

by G. D. Sauter; W. R. Ott  
Publ: Journal of the Air Pollution Control Association v24 n1 p54-9 (Jan 1974)  
1974 ; 7refs  
Availability: See publication

HS-014 841

## **INFLUENCES OF ALCOHOL UPON CONTROL-RESPONSE TIMES AND BRAKE PRESSURE MODULATION DURING SIMULATED PASSING**

Sixteen subjects drove an instrumented car in a simulated passing maneuver that involved emergency control-responses in an abort situation, as well as the more relaxed control responses associated with return-to-lane procedures. Driving was accomplished on one practice day and two test days, and following ingestion of an alcohol and a placebo beverage. Alcohol (90 mg%) significantly increased steering and braking

response times in both driving situations and decreased the rise times of brake pressure curves produced during stopping.

by M. S. Huntley, Jr.; M. W. Perrine; R. S. Kirk  
Vermont Univ., Burlington  
Contract FH-11-7469  
1973 ; 7p  
Presented at the First International Conference on Driver Behaviour, Zurich, Switzerland, Oct 1973.  
Availability: Corporate author

HS-014 842

## **TRAFFIC SPEED REPORT NO. 91. INTERIM REPORT**

In a continuing study of speeds of vehicle on rural Indiana highways, observations of spot speeds were taken on interstate, four-lane, and two-lane highways. Analysis showed the overall average speed for passenger cars was 65.20 mph, and 58.8 mph for heavy trucks. Simple linear regression analysis on the data of the past 11 years showed an annual increase of 0.62 mph for the overall average speed of passenger cars and 0.78 mph for heavy trucks. These trends are less than that of a 10-year period ending five or six years ago and appear to result from a leveling off of maximum speeds in recent years.

by A. A. Gadallah; G. K. Stafford  
Joint Highway Research Project, Lafayette, Ind.  
Rept. No. JHRP-74-5 ; 1974 ; 36p  
Availability: Purdue Univ., School of Civil Engineering, Lafayette, Ind.

HS-014 843

## **MOTOR CARRIER ACCIDENT INVESTIGATION. HERNANDO PACKING COMPANY AND OSBORNE TRUCK LINE, INC., ACCIDENT--AUGUST 27, 1973--MEMPHIS, TENNESSEE**

The case report of a four-truck collision which resulted in one fatality, three injuries, and \$57,000 property damage is presented. The tractor trailer went out of control, sideswiped a southbound pickup truck, crossed the median and collided head-on with another tractor trailer in the opposing traffic lane, which then collided with a second pickup. It is concluded that the probable cause of the accident was a steering link failure in the first tractor trailer truck, which had been poorly maintained. There was evidence of a lack of proper periodic inspection. Photographs are included.

Bureau of Motor Carrier Safety, Washington, D. C.  
Rept. No. 73-8 ; 1973 ; 12p  
Availability: Corporate author

HS-014 844

## **EFFECTS OF ALCOHOL ON PSYCHOMOTOR SKILL AND DECISION-MAKING IN A DRIVING TASK**

The effects of alcohol on psychomotor performance and decision-making were investigated using a driving task conducted on a test course. Subjects were required both to attempt an avoidance maneuver and to make decisions about whether the attempt would be successful. Moderate financial payoffs were

of psychomotor skill for light drinkers than for moderate drinkers. Alcohol had only small effects on the riskiness of subjects' decisions. The results suggest that the motivational effect of moderate financial payoffs reduces the extent of alcohol-induced risk-taking reported in earlier experiments.

by K. Snapper; W. Edwards  
Michigan Univ., Ann Arbor  
Grant MH22063-01

Rept. No. 730091; 1973; 38p 5refs

Presented at the Congress and Exposition, Cobo Hall, Detroit, Jan 73. Part of Doctoral dissertation of K. Snapper.

Availability: Reference copy only

HS-014 845

## HOW FORD EVALUATES THREE TYPES OF ELECTRIC VEHICLES

Results are presented of in-depth feasibility studies on a small, minimum performance city car, a higher-performing metropolitan car, and a delivery van/city bus with electric drive. A state-of-the-art examination of storage batteries is also included, along with future drivetrain, braking, and steering requirements.

by L. E. Unnewehr; D. R. Hamburg; L. R. Foote  
Publ: Automotive Engineering v82 n6 p37-41, 75, 77 (Jun 1974)  
1974

Based on paper presented at the Third International Electric Vehicle Symposium, Feb 1974, Washington, D. C.

Availability: See publication

HS-014 846

## IS YOUR FLEET READY FOR ELECTRIC VEHICLES?

The variety of sizes and shapes in electric vehicles is discussed in an examination of production and prototype vehicles. It is shown that small delivery vans hold the biggest potential. Reasons for the new interest in the vehicles are outlined, including fuel shortages, technological breakthroughs, positive industrial support, and moral and financial support from government agencies. Their use as fleet vehicles is considered, and the cost benefits are assessed.

by B. Rawson  
Publ: Commercial Car Journal v127 n3 p112-7 (May 1974)  
1974

Availability: See publication

HS-014 847

## MAINTENANCE/DESIGN PROBLEMS WITH EARTHMOVING MACHINES

Recurring maintenance and design problems associated with earthmoving machines are discussed. It is noted that contractors continue to buy the standard products although they are not entirely satisfied with them. Negligible cost saving and convenience are cited. Problem areas include fluid level check locations, fueling nozzles, radiator sight glass, hydraulic fluid filtering, rollover frames, horns, radiator hose failures, water pump seal failures, lubrication systems, rapid wear items, elec-

tric wiring, tow hoods, rock damage, bumper needs, and recurring structural damage.

by C. E. Sanders  
Publ: Automotive Engineering v82 n6 p44-9 (Jun 1974)  
1974

Based on SAE-740448, "Maintenance and Design Problems with Current Earthmoving Machines," presented at the 25th Anniversary Earthmoving Industry Conference, Peoria, Ill., 23-24 Apr 74, 1974.

Availability: See publication

HS-014 848

## COOLING SYSTEM CONDITIONERS: LIQUIDS VS. FILTERS

The use of non-chromate liquid coolant conditioners, compatible with antifreeze, are discussed as a replacement for pot-type and spin-on water filters in vehicle cooling systems. The availability of new chemicals is cited, and procedures are offered for changing to a non-chromate formula. Recommendations of engine manufacturers are mentioned, and storage precautions for liquid conditioners are described. Comments from a group of key fleet maintenance men are included.

by R. Cross  
Publ: Commercial Car Journal v127 n3 p106-11 (May 1974)  
1974

Availability: See publication

HS-014 849

## A QUIET HEAVY LORRY

A research project to develop demonstration quiet heavy vehicles is described. They are due to be available after about three years, and are intended to be at least 10dB(A) quieter than current vehicles under normal operating conditions. An estimate is included of the effects on the overall noise climate of the use of heavy vehicles quietened to this level. A case is established for not resting content with producing quieter trucks, but for proceeding also to reduce the noise level of cars.

by L. H. Watkins  
Publ: Commercial Motor (22 Mar 1974)  
1974; 5p 2refs

Reprint.

Availability: See publication

HS-014 850

## THE AUTOMATIC MAPPING OF TRAFFIC CRASHES

A system for the automatic mapping of traffic crashes, called Automap, is described. The system utilizes crash reports routinely supplied by law enforcement agencies. A great initial effort is required in building the initial geobase, but updating is relatively straightforward. Once the data base is built, computer-made maps can be constructed easily and at low cost. This system is versatile in both the types of subsets that can be created as well as the maps which are produced. The biggest advantage is the simplicity of operation in constructing maps, which frees the user for concentration on the analysis

of traffic crash phenomena without the burden of having to know the technical details of a computer mapping system.

by H. Moellering

Publ: Surveying and Mapping v33 n4 p467-76 (Dec 1973)

1973 ; 15refs

Presented at the ACSM Fall Convention, Columbus, Ohio, 11-14 Oct 1972.

Availability: See publication

HS-014 851

## **ALCOHOL, SLEEP DEPRIVATION, AND DRIVING SPEED EFFECTS UPON CONTROL USE DURING DRIVING**

An instrumented car was driven through a simple, short, pylon-defined serpentine course on each of four experimental days, on four consecutive trials each day, after ingestion of an alcohol or a placebo beverage, and after a night of normal sleep or following 29 hours of sleep deprivation. In general, alcohol significantly increased control-use rate, but sleep deprivation significantly decreased the effects of alcohol on coarse-steering reversal rates. The magnitude of alcohol effects upon coarse-steering reversal rates was directly and significantly related to the extraversion of the drivers. It was concluded that, if control-use behavior were to serve as an index of alcohol-associated impairment, the influence of sleep deprivation and individual differences would have to be taken into consideration.

by M. S. Huntley, Jr.; T. M. Centybear

Contract FH-11-7469

Publ: Human Factors v16 n1 p19-28 (Feb 1974)

1974 ; 17refs

Availability: See publication

HS-014 852

## **DETECTION OF CHANGES IN AUTOMOBILE STEERING SENSITIVITY**

Twelve drivers detected changes in vehicle steering sensitivity in free maneuvering of limited duration. The changes were produced by diverse means, and drivers' discrimination of changes was determined as just noticeable differences in yaw rate sensitivity. These measures were not significantly different for changes being made in steering ratio, stability factor, and vehicle speed. This result supports the hypothesis that drivers detect changes in yaw rate sensitivity when attempting to discriminate changes in steering sensitivity. Drivers readily detected changes in yaw rate sensitivity, the overall average just noticeable difference being relatively small. It is suggested that yaw rate sensitivity is an input/output quantity of fundamental importance.

by P. Sweatman; P. N. Joubert

Publ: Human Factors v16 n1 p29-36 (Feb 1974)

1974 ; 18refs

Supported by the Australian Road Res. Board.

Availability: See publication

HS-014 853

## **A NEW KIND OF RADAR FOR COLLISION AVOIDANCE**

An experimental automobile radar designed to avoid rear end collisions on highways is described. A completely passive reflector, mounted on the back of vehicles, returns the second harmonic of the frequency transmitted from the trailing vehicle. The radar is immune to clutter since its receiver is tuned to the second harmonic frequency only. It is also immune to blinding by cars traveling in the opposite direction, as well as to other interference problems inherent in a dense environment.

by J. Shefer; R. J. Klensch; H. C. Johnson; G. S. Kaplan

RCA Corp., New York

Rept. No. SAE-740096 ; 1974 ; 14p 9refs

Presented at the Automotive Engineering Congress, Detroit, 25 Feb-1 Mar 1974.

Availability: SAE

HS-014 854

## **NEW STIRLING-POWERED ZERO-POLLUTION CAR RUNS ON STORED HEAT**

The development of a new Stirling-powered zero-pollution car is described which combines the technology of the Stirling engine with that of molten-salt heat storage. Heat to run the engine is stored in a molten-salt mixture in sealed cylinders, transmitted to the engine through a heat pipe. The engine is refueled by reheating the molten-salt cylinders electrically. The quietness of the engine is discussed, and comparisons with the V8 engine are offered.

by D. Scott

Publ: Popular Science v204 n6 p66-8, 148 (Jun 1974)

1974

Availability: See publication

HS-014 855

## **CLEVER ENGINEERING BRINGS THE ELECTRIC CAR CLOSER TO YOUR DRIVEWAY**

Engine conversions to electric power are discussed in terms of engineering status, problems, and progress. The need for revised vehicle design to be integrated with the propulsion system is noted, including small diameter tires, and minimum body and chassis weight. Volkswagen's electric vehicle program is described, and five types of batteries under development are outlined. It is concluded that when these batteries become commercially available in the 1980's, electrocars should be well established.

by J. P. Norbye

Publ: Popular Science v204 n6 p40, 42, 44, 46, 148 (Jun 1974)

1974

Availability: See publication

Statistics of the Vermont population, its use of informational media, and its interest in learning about certain components of alcohol and highway safety but not about others. Drinking patterns are reviewed, along with the percentage of high risk drivers of different ages using various media at least occasionally, and the relative ranking of media within the age group. A 27% drop from pretest measurements in blood alcohol concentrations of 50 mg% or higher among drivers in the untermasured portion of the state was found.

J. A. Waller; J. K. Worden  
Vermont Univ., Burlington  
1973 ; 23p 8refs

Prepared for presentation at the Conference on Evaluation of SAP Projects, sponsored by the Office of Alcohol Countermeasures, U. S. Dept. of Transp., Bethesda, Md., 10-Sep 1973.

Availability: Reference copy only

S-014 857

## **FATAL AND INJURY ACCIDENT RATES ON FEDERAL-AID AND OTHER HIGHWAY SYSTEMS 1972**

Data on fatal and nonfatal injuries in motor vehicle traffic accidents for 1972 are summarized, compiled from reports submitted by all 50 states and the District of Columbia. Tables provide information on: fatality rate trends by highway system; fatality and fatal accident rates by highway system and state; injury and injury accident rates by highway system and state; fatal and injury accident data related to vehicle registrations, population, and licensed drivers; fatalities, fatal accidents, and travel; and injury accidents, persons injured, and travel. Data are included for all roads and streets in the U. S.

Federal Hwy. Administration, Washington, D. C.  
1973 ; 43p  
Availability: Corporate author

S-014 858

## **STATEWIDE TRAVEL DEMAND FORECASTING**

Current techniques, practice, and recommendations, and areas of needed development in the field of statewide travel demand forecasting are discussed, with emphasis on the need for flexibility. Socioeconomic, facility, and travel data are examined for the forecasting and simulation of statewide travel networks and zones. Development of a model covers trip generation, trip distribution, traffic assignment, and calibration. Forecasting is presented in terms of population, economics, and travel. The application of the model to system analysis, impact analysis, program development, and design is included.

Federal Hwy. Administration, Washington, D. C.  
1973 ; 190p refs  
Availability: Corporate author

sorption crash barriers. Current research is examined along with data on impact attenuator accident rates. Examples and photographs are included.

by F. J. Tamanini  
Federal Hwy. Administration, Washington, D. C.  
Publ: Proceedings of the 59th Annual Road School (Series 141)  
p10-50 (Mar 1973)  
1973 ; 35refs  
Conference held at Purdue Univ., 7-10 Mar 1973.  
Availability: See publication

HS-014 860

## **RESEARCH ON ENVIRONMENTAL FACTORS AFFECTING HUMAN BEHAVIOR**

The interaction between the highway information system and the complex nature of the driving task is examined along with the development of diagrammatic guide signs in the U. S. Three activities of the driving task are cited as control, guidance, and navigation. The role of expectancy in receiving and processing information is discussed in terms of these three tasks. Evaluation studies of diagrammatic signs are reported and their benefits are assessed.

by G. J. Alexander  
Publ: Proceedings of the 59th Annual Road School (Series 141)  
p51-6 (Mar 1973)  
1973  
Conference held at Purdue Univ., 7-10 Mar 1973.  
Availability: See publication

HS-014 861

## **HYBRID SIMULATION IN THE AUTOMOTIVE INDUSTRIES**

The role of digital and analog computers in automotive engineering is examined. The mechanisms of each are described along with their advantages and drawbacks, and the effectiveness of the hybrid computer in many cases is noted. Applications of hybrid computation include engine/vehicle simulation, antiskid braking control systems, vehicle ride simulation, directional stability, cumulative damage data reduction, and control systems design and optimization. It is concluded that the hybrid computer can solve problems that formerly were unsolvable or solvable only by clumsy, time-consuming methods.

by J. I. Soliman  
Publ: Journal of Automotive Engineering v4 n4 p12-17 (Aug 1973)  
1973 ; 33refs  
Availability: See publication



HS-014 862

HS-014 862

### **PUBLIC INVOLVEMENT FOR SAFETY GOALS**

Public involvement for highway safety goals is discussed in terms of public and private group participation. Federal management programs are reviewed along with accident trends and goals. Nine elements of a safety program are outlined which cover: drinking drivers, seat belt usage, highway upgrading and maintenance, youth traffic safety, pedestrian death reductions, better driver performance, better emergency medical services, improved local highway safety management, and improvement of vehicle safety by inspection. Specific recommendations regarding each element are offered.

by D. G. Mickle

Publ: Highway User Quarterly p3-8 (Spring 1974)  
1974

Availability: See publication

HS-014 863

### **FORE-AFT STIFFNESS CHARACTERISTICS OF PNEUMATIC TIRES**

A simple mathematical model is proposed for estimating the fore-aft elastic stiffness of pneumatic tires. The model is based on two idealized solutions, the first being that for the extensional stiffness of a pressurized tube reinforced with inextensible cords, and the second that for the shear deformation of an unpressurized elastic tube. The combination of these two elements permits estimation of fore-aft stiffness characteristics. The validity of the model was tested by static measurements at different inflation pressures of the fore-aft spring rates of four tires varying in size and construction. Comparison of the calculated and experimental results indicates that the trends are generally correct although close correlation between experiment and calculation is difficult to obtain.

by R. N. Dodge; S. K. Clark

Grant NGL-23-005-010

Publ: Tire Science and Technology v2 n2 p79-101 (May 1974)  
1974 ; 5refs

Supported by the Landing Dynamics Branch, Langley Res. Center, National Aeronautics and Space Admin.  
Availability: See publication

HS-014 864

### **WET SKID RESISTANCE OF CAR AND TRUCK TIRES**

Two test trailers for measuring tire characteristics are described. One is specially built for testing car tires and can steer, camber, and brake the test tire. This trailer is provided with a five-component measuring hub. The second trailer, for testing truck tires, is restricted to braking only. Braking forces are measured with a dynamometer. The determination of peak and locked wheel braking force coefficients is discussed, and a method for obtaining side force coefficients for car tires is given. Test results are given for both car and truck tires showing the influence of road surface texture, speed, and tread depth on skid resistance, and the results are compared.

HS-014 865

### **ANALYSIS OF RIM AND BELT CONSTRAINTS ON THE FORCES AND MOTIONS OF A TIRE**

A model is proposed for the influence of the rim and load carrying in tires. It consists of an infinitely long thin-walled tube whose cross-sectional geometry is defined by two rigid plates. The model structure is subjected to a vertical load, a transverse load, and a rotational load. A general set of equations is derived in terms of two geometric parameters. Methods of numerical solution are given which hold whether forces or deflections are the dependent variables. Numerical results are given for slow motions and deflections specified.

by D. W. Nicholson

Publ: Tire Science and Technology v2 n2 p117-29  
1974 ; 4refs

Availability: See publication

HS-014 866

### **RESONANT SOUND AND VIBRATION CHARACTERISTICS OF A TRUCK TIRE**

Bias ply truck tire resonant vibration and sound were evaluated in the laboratory by standard vibration measurement procedures. Four resonances were identified between 90 and 250 Hz. Analysis of the sound fields showed that each isolated resonant mode radiated acoustic energy like a simple source. The modes were determined to be acoustically slow with acoustic radiation emanating from a region with a length of the tire footprint.

by W. F. Reiter, Jr.

Publ: Tire Science and Technology v2 n2 p130-41  
1974 ; 11refs

Supported by the National Aeronautics and Space Administration, the Office of Noise Abatement, U. S. Dept. of Transportation  
Availability: See publication

HS-014 867

### **COMPARATIVE STUDY OF TREAD DEPTH MEASUREMENT TECHNIQUES**

ASTM Committee F-9 on Tires organized an experiment in which four tires were measured at 14 laboratories using most major tire producers and independent test methods according to their normal practice, and the tread depth measurement techniques were compared. The data generally show that there are significant differences between laboratories. Precision varies between laboratories. Practices between laboratories vary greatly with respect to the number and locations at which measurements are made. On ribbed tires, 7 of 14 laboratories measured at 10 positions each. For snow tires, the most common practice.

by F. C. Brenner; A. Kondo

Publ: Tire Science and Technology v2 n2 p142-56  
1974

HS-014 868

**THE INTERACTION OF MALE AND FEMALE CAR DRIVERS AT ROUNDABOUTS**

A technique is described for observing face-to-face encounters between car drivers. A high degree of inter-rater reliability was achieved. It was found that female drivers give way to male drivers in such encounters at traffic circles. Observations of the make of car and sex of the driver showed that there was a significant lack of women driving the larger cars. Observations of interactions of male drivers showed that the size of the vehicle was not a determinant of yielding behavior. The possible protective effect of this behavior was investigated by examining the accident statistics. It was found that the proportion of male-female accidents was lower for priority situations than for non-priority situations, but the difference was not significant.

by J. Leff; J. Gunn

Publ: Accident Analysis and Prevention v5 n4 p253-9 (Dec 1973)

1973 ; 2refs

French and German abstracts.

Availability: See publication

HS-014 869

**A STUDY OF DRIVER EXPERIENCE AND VEHICLE FAMILIARITY IN ACCIDENTS**

As part of a major accident investigation project, a separate study tested the hypothesis that drivers of vehicles involved in investigated accidents had less driving experience than the general driving population, and that accident involved drivers were less familiar with their vehicles. A Kolmogorov-Smirnov one-tail test was employed to evaluate the differences in the distributions of driver experience and vehicle familiarity between the accident sample and a control sample. Results indicated that drivers involved in the investigated accidents had less driving experience in general and had less driving experience with the accident vehicles than drivers in the general population. These effects are discussed briefly and further studies are suggested.

by J. C. Fell; E. F. Mudrowsky; K. J. Tharp

Publ: Accident Analysis and Prevention v5 n4 p261-5 (Dec 1973)

Rept. No. CAL-TR-VJ-2224-V-4 ; 1973 ; 3refs

Sponsored by the Automobile Manufacturers Assoc., Inc.

French and German abstracts.

Availability: See publication

HS-014 870

**SEAT BELTS: THE IMPORTANCE OF SITUATIONAL FACTORS**

Two complementary studies investigated the relative importance of situational and individual factors in seat belt usage in private cars. In one, a 75 car owner-questionnaire showed a major situation difference between city and highway situations with only small variations within each environment. Point estimates of variance showed most variation was due to individual factors. The second study was conducted to get some indica-

questionnaire. The results of cross validation supported the model. The correspondence between reported and observed belt use was relatively high. It was concluded that verbal reports could be used as indicators of seat belt use.

by G. Phaner; M. Hane

Publ: Accident Analysis and Prevention v5 n4 p267-85 (Dec 1973)

1973 ; 12refs

Prepared in cooperation with the National Swedish Road Safety Office, and supported by the Swedish Renault, Inc. French and German abstracts.

Availability: See publication

HS-801 145

**POLICE TRAFFIC SERVICES SUPERVISOR INSTRUCTOR TRAINING INSTITUTE. FINAL REPORT**

Key individuals are exposed to the NHTSA-developed curriculum materials for police traffic services (PTS) supervisor and they are instructed how to teach. Five 30-hour instructor training institutes were conducted in various areas of the country in 1973 in various educational institutions. A total of 65 enrollees completed the training program, representing 36 states, Puerto Rico, NHTSA, and two American Indian organizations. Sections are included on: planning; selecting institute sites and dates; developing/adapting course materials; obtaining PTS supervisor course materials; enrolling and informing candidate selecting and orienting teacher trainers; conducting and evaluating institutes; and providing follow-up services.

by A. M. Cleven

Dunlap and Associates, Inc., Darien, Conn.

Contract DOT-HS-099-3-760

1974 ; 178p

Availability: NTIS

HS-801 147

**MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS--DETAILED REPORTS FROM JANUARY 1 TO MARCH 31, 1974**

Letters of notification and other communications to dealers and their customers regarding possible defects in vehicles produced by domestic and foreign manufacturers are presented without commentary.

National Hwy. Traf. Safety Administration, Washington, D.C. 1974 ; 513p

Availability: NTIS

HS-801 148

**MOTOR VEHICLE SAFETY DEFECT RECALL CAMPAIGNS REPORTED TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION BY DOMESTIC AND FOREIGN VEHICLE MANUFACTURERS, JANUARY 1 1974 TO MARCH 31, 1974**

This tabulation of safety defect recall campaigns includes

HS-801 156

tomobiles, trucks, school buses, trailers, and tractors are included.

National Hwy. Traf. Safety Administration, Washington, D.C.  
1974 ; 237p  
Availability: GPO \$0.60

HS-801 156

**AUTOMOTIVE RECORDER RESEARCH DISC  
RECORDER PILOT PROJECT. VOL. 2: RESULTS OF  
TESTS AND EVALUATIONS. TECHNICAL REPORT**

The status of the Disc Recorder Project is reported. The types of tests (vehicle crash tests and environmental tests) to which the disc recorders have been subjected are described, and the results are given of the crash triaxial acceleration/time history measurements during vehicle collisions. The recorders provide firm unbiased relationships of vehicle crash severity with occupant fatalities and serious injuries from real-world accidents. Information and experience gained from the early research and development efforts form the foundation for future large scale recorder research.

by S. S. Teel; S. J. Peirce; N. W. Lutkefедder  
National Hwy. Traf. Safety Administration, Washington, D.C.  
1974 ; 103p  
Rept  
Availability: NTIS

HS-801 161

**EVALUATION OF PORTABLE BREATH TEST  
DEVICES FOR SCREENING SUSPECTED DRUNKEN  
DRIVERS BY POLICE IN HENNEPIN COUNTY,  
MINNESOTA. FINAL REPORT**

The field use of portable breath test (PBT) devices by police in Hennepin County, Minnesota, is examined. The five parts of the report deal with: an informal summary of information emerging from the PBT evaluation, applicable to police officials and administrators, public officials, and others concerned with traffic safety; an analysis and discussion of data collected during the evaluation; maintenance and performance problems; attitudes of officers, PBT calibrators, and supervisory personnel toward the PBT and the concept of pre-arrest screening; and an attempted controlled study which did not yield sufficient data. The results indicate that pre-arrest screening devices are accepted by and useful to the police and that the models tested functioned accurately and dependably.

by S. D. Rosen; B. H. Sielaff; F. Romslo; V. E. Weckwerth;  
F. Lowery; R. A. Mons; D. M. Kramer; D. A. Schaefer  
Contract DOT-HS-048-1-064  
1974 ; 146p  
Rept. for Apr-Aug 1973.  
Availability: NTIS

HS-801 165

**MULTIDISCIPLINARY ACCIDENT INVESTIGATION-  
-PEDESTRIAN INVOLVEMENT. FINAL REPORT**

The Houston Multidisciplinary Accident Investigation team in-

city, or pedestrian and vehicle actions prior to the linear relationship between injury severity and was found. Injury severity varies with impact and injuries occur with vehicle contact to the next in impacts. Vehicle contact results in more severe road surface contact. Recommendations are offered for education and training, lane separation, vehicle park traffic control modifications, speed limits, and design.

by K. J. Tharp  
Houston Univ., Tex.  
Contract DOT-HS-087-1-117  
1974 ; 128p 11refs  
Rept. for Jun 1971 - May 1973.  
Availability: NTIS

HS-801 167

**UTAH MULTIDISCIPLINARY HIGHWAY  
INVESTIGATION. VOL. 1. FINAL REPORT**

A Utah Auto Crash Research Team progress findings concerning 25 in-depth multidisciplinary are presented. The study focused on accident causation, new safety feature effectiveness, design and functional problems of vehicles and the aging effects in vehicles and the value of police inspection.

by J. T. Weston  
Utah State Div. of Health, Salt Lake City  
Contract FH-11-7221  
1974 ; 105p  
Rept. for 6 June 1969-31 May 1970. Prepared in cooperation with the Utah Univ. Dept. of Engineering.  
Availability: NTIS

HS-801 172

**EVALUATION OF THE MICROCAPSULE  
MEASUREMENT PADS. TECHNICAL REPORT**

Dye-filled Microcapsule pads for measurement of face pressures were evaluated in simulated auto tests on test dummies restrained by seat belts. The capsule pads were exposed to belt loads on the chest and abdomen and to head impacts against the helmet. The limited amount of testing good agreement was found between the pressures measured with microcapsule pads and corresponding values computed from belt tension and acceleration measurements. A high potential is indicated for a measurement tool which requires further investigation and development.

by V. G. Radovich  
National Hwy. Traf. Safety Administration, Washington, D.C.  
1974 ; 13p 2refs  
Availability: NTIS

HS-801 186

**EMERGENCY MEDICAL SERVICES PROJECT  
(SERVICES MEDICAUX D'URGENCE)**

viding medical treatment to persons injured in vehicle  
shes. Procedures and practices found to be working effec-  
tly in one country were studied and communicated to  
ers. Focus is on the evaluation methodology as well as  
mmendations.

Committee on the Challenges of Modern Society, Brussels  
(Belgium)  
t. No. CCMS-22 ; 1974 ; 154p  
t in English.  
Availability: Corporate author; NHTSA

801 187

### **EXPERIMENTAL SAFETY VEHICLES PROJECT (VEHICULES EXPERIMENTAUX DE SECURITE)**

history, objectives, accomplishments, and recommenda-  
s of the NATO Experimental Safety Vehicle (ESV) Project  
presented. Programs in the Federal Republic of Germany,  
nce, Italy, Japan, Sweden, the United Kingdom, and the  
ted States are reviewed. Conclusions and recommendations  
given regarding excessive weight, aggressiveness, opera-  
al handling, and research areas, including testing.

Committee on the Challenges of Modern Society, Brussels  
(Belgium)  
t. No. CCMS-23 ; 1974 ; 13p 4refs  
t in English.  
Availability: Corporate author; NHTSA

801 188

### **ACCIDENT INVESTIGATION (PROJECT SUR ENQUETE D'ACCIDENTS)**

history, objectives, accomplishments, and recommenda-  
s of the NATO Accident Investigation Project are  
ewered. Details are given on: accident severity parameters,  
ious workshops, organizational and operational structure,  
mon report forms, submission of case reports, data han-  
g and analysis, preliminary results from international traf-  
accident data, and a proposed international accident in-  
igation system. Some national and international conclu-  
sions, recommendations, and implementation actions are  
sented.

Committee on the Challenges of Modern Society, Brussels  
(Belgium)  
t. No. CCMS-26 ; 1974 ; 237p 1ref  
t in English.  
Availability: Corporate author; NHTSA

801 189

### **PEDESTRIAN SAFETY PROJECT (SECURITE DES TONS)**

history, objectives, accomplishments, and recommenda-  
s of the NATO Pedestrian Safety Project are presented.  
ht areas are treated: regulation and enforcement of  
estrian crossing systems; allocation of resources; traffic  
management and urban transportation planning; education and  
ormation; urban planning; vehicle driver; pedestrian

behavior; and statistics. Papers prepared by the partipants and  
reviewed by the group are included.

Committee on the Challenges of Modern Society, Brussels  
(Belgium)  
Rept. No. CCMS-27 ; 1974 ; 152p refs  
Text in English.  
Availability: Corporate author; NHTSA

HS-801 190

### **MOTOR VEHICLE INSPECTION PROJECT (INSPECTION DES VEHICULES A MOTEUR)**

The history, objectives, accomplishments, and recommenda-  
tions of the NATO Motor Vehicle Inspection Project are  
presented. Nations involved include Belgium, Federal Republic  
of Germany, Denmark, United Kingdom, and the United  
States. For each country, data are given on institutions in  
charge of inspection, qualifications and training of personnel,  
and other considerations. The extent of inspection programs,  
justification, research and development needs, and interna-  
tional cooperation for the purpose of establishing uniform pro-  
grams are outlined, and recommendations are offered.

Committee on the Challenges of Modern Society, Brussels  
(Belgium)  
Rept. No. CCMS-24 ; 1974 ; 122p 17refs  
Text in English.  
Availability: Corporate author; NHTSA

HS-801 192

### **ALCOHOL SAFETY ACTION PROJECTS EVALUATION OF OPERATIONS--1972. VOL. 2: DETAILED ANALYSIS. CH. 1: DEVELOPMENT AND MANAGEMENT OF THE ASAP PROGRAM**

The development and management of the Alcohol Safety Ac-  
tion Projects (ASAP) is discussed. Details are given on: histo-  
ry of the NHTSA alcohol Countermeasures Program; ASAP  
site selection procedures; community capabilities and organiza-  
tion; evidence for the role of alcohol in crashes; drinking pat-  
terns; enforcement, court, treatment, and public information  
and education countermeasures; deterring the social drinker;  
funding and management of ASAP projects; and advisory  
committees. Some conclusions and recommendations are: pro-  
ject objectives are best supported by a governmental unit hav-  
ing overall responsibility in traffic safety, public health, and  
court operations; and prominence of the prime contractor and  
project sponsorship by a high-ranking official influence project  
potential.

National Hwy. Traf. Safety Administration, Washington, D. C.  
1974 ; 33p 8refs  
Ch. 1 of 7.  
Availability: NHTSA

HS-801 193

### **ALCOHOL SAFETY ACTION PROJECTS EVALUATION OF OPERATIONS--1972. VOL. 2: DETAILED ANALYSIS. CH. 2: ASAP PROGRAM**

HS-801 194

## **EVALUATION METHODOLOGY AND OVERALL PROGRAM IMPACT**

Evaluation methodology and overall impact of the Alcohol Safety Action Projects (ASAP) are discussed. Details are given on: evaluation procedures; computerized data system and data availability; time series analysis of variance technique; identification of criteria such as crash severity, measures of alcohol involvement, blood alcohol concentration, alcohol-related, nighttime, and single vs. multivehicle crashes, and roadside surveys; results of individual ASAP projects; and the impact of ASAP on drinking habits, the community, driver behavior, nighttime and total fatal crashes.

National Hwy. Traf. Safety Administration, Washington, D. C. 1974 ; 84p 26refs  
Ch. 2 of 7.  
Availability: NHTSA

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## **ALCOHOL SAFETY ACTION PROJECTS EVALUATION OF OPERATIONS--1972. VOL. 2: DETAILED ANALYSIS. CH. 3: EVALUATION OF THE ENFORCEMENT COUNTERMEASURE ACTIVITIES**

An evaluation of the enforcement countermeasure activities of the Alcohol Safety Action Projects (ASAP) is presented. Consideration is given to their background, objectives, results, and highlights of analytic studies. An analysis of arrest efficiency by time of day suggests that significant increases in arrests could be achieved by rescheduling patrol manhours more heavily in the midnight to 4 a.m. time period. Further increases in efficiency seem possible by the use of mobile breath testing vans in some areas, as well as by the use of roadside prearrest breath testing devices. It is concluded that arrest rates below 2% of licensed drivers are not likely to produce any significant deterrence of driving while intoxicated or identify even a nominal number of the problem drinkers for possible help by ASAP treatment programs.

National Hwy. Traf. Safety Administration, Washington, D. C. 1974 ; 21p 1ref  
Ch. 3 of 7.  
Availability: NHTSA

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## **ALCOHOL SAFETY ACTION PROJECTS EVALUATION OF OPERATIONS--1972. VOL. 2: DETAILED ANALYSIS. CH. 4: EVALUATION OF THE JUDICIAL AND LEGISLATIVE COUNTERMEASURE ACTIVITIES**

An evaluation of the judicial and legislative countermeasure activities of the Alcohol Safety Action Projects (ASAP) is presented with focus on: objectives; rehabilitation and retraining as an alternative to punitive sanctions; gathering evidence; flexibility in sentencing; examples of programs; presentence investigation; probation personnel; court personnel and physical facilities; special prosecutors; and individual activity in the

the growing backlog of cases and the lack of court resources for some judges and prosecutors to the processing of cases.

National Hwy. Traf. Safety Administration, Washington, D. C. 1974 ; 20p 1ref  
Ch. 4 of 7.  
Availability: NHTSA

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## **ALCOHOL SAFETY ACTION PROJECTS EVALUATION OF OPERATIONS--1972. VOL. 2: DETAILED ANALYSIS. CH. 5: EVALUATION OF THE PRE-SENTENCE INVESTIGATION AND PROBATION COUNTERMEASURE ACTIVITIES**

The pre-sentence investigation (PSI) and probation countermeasure activities of the Alcohol Safety Action Projects (ASAP) are evaluated. Details are given on: development of PSI techniques; medical/psychological symptoms; drinking; self-report information; PSI effectiveness; volume; PSIs as a function of arrests and conviction; of drinker classification; court cooperation; PSI results of selected ASAP results. It is concluded that the most effective PSI tolls are blood alcohol concentration at time of arrest, driver and criminal records, and procedures for problem drinkers including questionnaire and interview. It appears that the timing of the investigation is not critical. Use of the information from it in appropriate disposition case is important. The PSI and probation functions should be administered when combined in a single office.

National Hwy. Traf. Safety Administration, Washington, D. C. 1974 ; 23p 20refs  
Ch. 5 of 7.  
Availability: NHTSA

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## **ALCOHOL SAFETY ACTION PROJECTS EVALUATION OF OPERATIONS--1972. VOL. 2: DETAILED ANALYSIS. CH. 6: EVALUATION OF THE REHABILITATION COUNTERMEASURE ACTIVITIES**

The rehabilitation countermeasure activities of the Alcohol Safety Action Projects (ASAP) are evaluated. Details are given on: the effectiveness of various penal sanctions in reducing chronic offender behavior; rehabilitation efforts and results; system; problems in the development and implementation of various treatment modalities; functioning characteristics of the ASAP system; and processing of particular drinker treatment modality, and characteristics of alcohol treatment schools alone. Other rehabilitation measures are also evaluated. Firm conclusions regarding effectiveness of alcohol treatment schools in reducing recidivism were made. If an effect in reducing recidivism was found, it appeared that it was with younger, better educated offenders with prior arrest records.

National Hwy. Traf. Safety Administration, Washington, D. C. 1974 ; 65p 42refs

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**ALCOHOL SAFETY ACTION PROJECTS  
EVALUATION OF OPERATIONS--1972. VOL. 2:  
DETAILED ANALYSIS. CH. 7: EVALUATION OF  
THE PUBLIC INFORMATION AND EDUCATION  
COUNTERMEASURE ACTIVITIES**

The public information and education countermeasure activities of the Alcohol Safety Action Projects (ASAP) are evaluated in terms of objectives and results. Details are given on: youth; strategies and target populations; enforcement, judicial,

medical, and youth programs; programs for educators and clergy; specific ASAP activities; NHTSA support; coordination of public education activities within the ASAP community; and methods of evaluation. Further consideration is given to an evaluation of the results of ASAP campaigns; ASAP survey results; campaigns directed at specific target groups; and national public attitude survey.

National Hwy. Traf. Safety Administration, Washington, D. C. 1974 ; 21p 9refs  
Ch. 7 of 7.  
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